July 2021

Binder 153, Opecoelidae Ps-Z [Trematoda Taxon Notebooks]

Harold W. Manter Laboratory of Parasitology

OPECOELIDAE

PSEUDOCOITOCAECUM, ~~new genus.~~ Fatima Mujib Bilqees, 1972

Generic diagnosis : Opecoelidae, Opecoeline. Body smooth, elongate and delicate. Oral sucker subterminal, followed by short prepharynx. Pharynx well developed. Esophagus very long about 1/5 of total body length. Ceca united near posterior end of the body. Acetabulum slightly larger than oral sucker, equatorial or slightly preequatorial. Testes irregular, tandem in posterior 1/3 of body. Vesicula seminalis elongated, enclosed in long muscular cirrus sac about 1/2 postacetabular. Prostate cells not distinct. Genital atrium poorly developed. Genital pore slightly anterior to acetabulum, far posterior to cecal bifurcation. Ovary distinctly lobed, submedian, pretesticular. Receptaculum seminis well differentiated, anterior to ovary. Vitellaria confluent in post-testicular region, extending lateral to caca reaching to or near level of cecal bifurcation. Uterus short, coiled between ovary and acetabulum. Eggs large, few in number. Excretory vesicle tubular reaching to the level of testes or ovary. Intestinal parasites of marine fishes.

PSEUDOCOITOCAECUM THIRSSOCLESIS, ~~new species.~~ Fatima Mujib Bilqees, 1972

(FIG-36)

HOST : *Thrissocles Purava* (Ham), Engraulidae.

HABITAT : Intestine.

LOCALITY : West wharf, Karachi coast.

NUMBER : 11 specimens in one of 7 hosts examined.

Body delicate, aspinose, 1.1-2.2 long, greatest width 0.35—0.4 at testicular region ; anterior end bluntly pointed, posterior rounded. Oral sucker subterminal 0.1—0.12 × 0.09—0.1, prepharynx 0.03—0.05 long. Pharynx well developed, 0.08—0.09 × 0.07—0.08 in size. Esophagus very long, 0.34—0.37 long. Ceca long uniting near posterior end of body. Acetabulum equatorial or slightly preequatorial, 0.12—0.15 × 0.11—0.15 in size. Testes tandem, in posterior 1|3 of body, intercecal, irregular in outline, 0.12—0.15 × 0.17—0.2. Cirrus sac muscular, and about half postacetabular, 0.4—0.45 long, containing long seminal vesicle. Prostate cells and cirrus indistinct, ejaculatory duct tubular small and probably functions as a cirrus. Genital atrium weakly developed, indicated only by few muscle fibres at genital pore. Genital pore immediately or slightly anterior to acetabulum, submedian, 0.35—0.4 posterior to cecal bifurcation. Ovary 0.09—0.11 × 0.09—0.1, tri-multilobed, submedian, pretesticular. Receptaculum seminis elongated, usally arcuate, immediately preovarian, 0.12—0.15 long. Shell gland complex not distinct, represented by dark staining area lateral to ovary. Vitelline follicles numerous, small, circumcecal posteriorly, extending lateral to ceca up to or near level of cecal bifurcation. Uterus short, coiling between ovary, and acetabulum, containing only five to 17 large eggs measuring 0.04—0.06 × 0.02—0.04. Excretory vesicle tubular extending up to the level of testes or ovary, more conspicuous in living specimens.

REMARKS

Pseudocoitocaecum resembles *Coitocaecum* Nicoll, 1915, as far as posterior union of ceca is concerned but the very long esophagus, the relatively small acetabulum, the long muscular cirrus sac extending posterior to acetabulum, and the genital pore at a great distance posterior to cecal bifurcation and slightly anterior to acetabulum, and presence of receptaculum seminis serve to distinguish *Pseudocoitocaecum* from *Coitocaecum*.

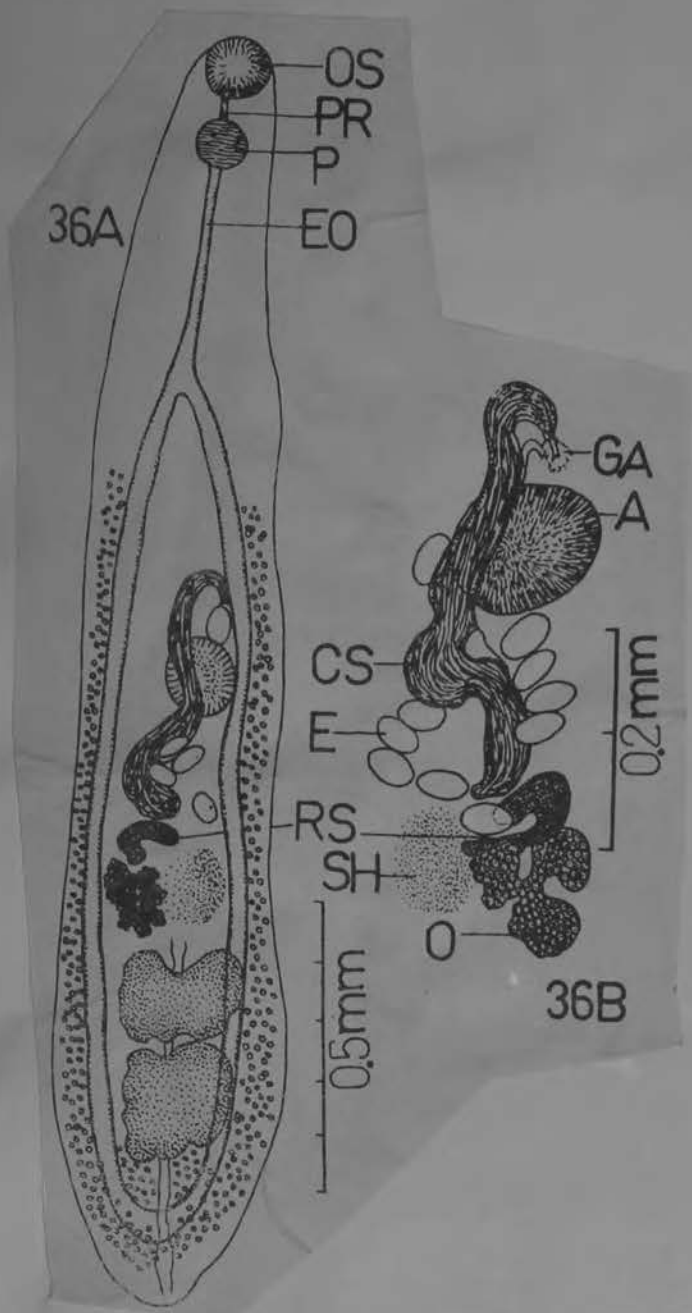

Fig. 36A. *Pseudocoitocaecum thrissoclesis* n. gen., n. sp., holotype.
Fig. 36B. Terminal genital ducts of a paratype.

PSEUDOCOITOCAECUM

Pseudopecoelina Yamaguti, 1942

Generic diagnosis. — Allocreadiidae, Opecoelinae: Body elongate, unarmed. Oral sucker ventroterminal, prepharynx present, pharynx well developed, esophagus short, ceca forming cloaca at posterior extremity. Acetabulum prominent but not pedunculate, near anterior extremity. Testes diagonal or tandem, in posterior half of body. No vesicula seminalis externa. Cirrus pouch long, extending far back of acetabulum, enclosing seminal vesicle, pars prostatica and long ductus ejaculatorius. Genital pore on the left of esophagus. Ovary pretesticular, median or submedian. No receptaculum seminis. Laurer's canal present. Uterus coiled between ovary and acetabulum. Vitellaria occupying dorsal and lateral areas between acetabulum and anterior testis but extending all round the body further behind. Excretory vesicle tubular, reaching ovary(?). Parasitic in intestine of marine fishes.

Genotype: *P. dampieriae* Yamaguti, 1942 (Pl. 14, Fig. 170), in *Dampieria hellmuthi*: Naha, Okinawa.

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Genotype: *P. dampieriae* Yamaguti, 1942 (Pl. 14, Fig. 170), in *Dampieria hellmuthi*; Naha, Okinawa.

PSEUDOPECOELINA Yamaguti,1942

Body elongate,unarmed. Oral sucker terminal. Prepharynx present; esophagus short; ceca opening terminally in common with excretory vesicle. Acetabulum prominent but not pedunculate, near anterior end. Testes slightly obliquely tandem, nearer to posterior end than to acetabulum. Cirrus sac long, containing seminal vesicle, pars prostatica and ductus ejactulatorius. Genital pore sinistral, level with esophagus. Ovary opposite and anterior to anterior testis. No seminal receptacle; Laurer's canal present. Uterus between ovary and acetabulum; metraterm with a distal, ring-like thickening of circular muscles. Vitellaria diffuse, filling all available space of hindbody. Excretory vesicle tubular. Parasites of marine fishes.

Type species: Pseudopecoelina dampieriae Yamaguti,1942

Pseudopecoelina dampieriae Yamaguti,1942

Length 1.5 to 2.9; width 0.45 to 0.6.
Oral sucker0.1 to 0.15 by 0.12 ~~by~~ 0.16
Acetabulum 0.24 to 0.25 mm. wide; prominent but sessile, without appendages.
Sucker ratio:
Esophagus 70 to 165 u long.
Testes entire, near posterior end, contiguous in contracted specimens, separated by 0.125 mm in extended specimens, covered dorsally by vitellaria.
Cirrus sac long extended backward as far as anterior end of middle third of body.
Ovary round. Metraterm well differentiated with cuticular hairs; distal sphincter present.
Excretory system not made out but "it seems certain that the vesicle opens into the anus ~~to-for~~ and forms a cloaca".
Host: Dampieria hellmuthi (Bleeker), a marine fish
Japan; Okinawa Province

Fig. 10.
Pseudopecoelina dampieriae, ventrolateral view.

Pseudopecoelina elongata [illegible]. (Fig. 4) Hafeezullah, 1971

TYPE HOST. *Upeneus bensasi* (Schlegel); goatfish; Mullidae.

OTHER HOST. *U. taeniopterus* Cuv.; barred-fin goatfish; Mullidae.

SITE. Intestine.

NUMBER OF SPECIMENS. 5.

TYPE LOCALITY. Mandapam, Gulf of Manaar.

OTHER LOCALITY. Madras, Bay of Bengal.

DESCRIPTION (with measurements based on five specimens). Body 2·531–3·396 mm long, 0·204–0·240 mm wide, elongate narrow, with short peduncle or protuberance bearing acetabulum near anterior extremity; forebody short and tapering anteriorly; hind body long, subcylindrical posterior end rounded or pointed. Cuticle unarmed. No accessory sucker in forebody. Acetabulum 152–179 × 164–178 (deep), spherical, without papillae. Oral sucker 110–120 long, 83–113 deep, subglobular, ventroterminal. Length ratio of suckers 1:1·38–1·62. Prepharynx 9–13; pharynx 74–90 × 90–96, globular; oesophagus short; caecae

ample becoming obscured posteriorly by the vitellaria, probably joining excretory esicle near posterior end to form cloaca.

Testes 155–256 × 134–164, oval or spherical, tandem, separated by vitellaria, in middle of posterior half of body. Cirrus sac long, tubular, extending far back of acetabulum containing long, tubular seminal vesicle, short *pars prostatica* and ejaculatory duct. Genital pore median, ventral, postpharyngeal. Post-testicular space 765–930.

Ovary 104–113 in diameter, spherical, median, pre-testicular, separated from anterior testis by vitellaria. Seminal receptacle absent. Shell gland preovarian. Vitelline follicles from halfway between acetabulum and ovary to short of posterior end of body, discontinuous in testicular and sparse in ovarian zones. Uterus scanty, preovarian. Eggs collapsed, 69–76 × 30–39. Excretory vesicle I-shaped, extent undetermined because of distribution of vitellaria; excretory pore terminal.

The present species has been placed in the genus *Pseudopecoelina* Yamaguti, 1942 because of the absence of an accessory sucker and acetabular papillae and the presence of a long and tubular cirrus sac. The condition of the posterior part of the caecae could not be ascertained. *Pseudopecoelina elongata* differs from the type species, *P. dampierae* Yamaguti, 1942, in the shape and size of the body, the longer post-testicular space and the larger eggs.

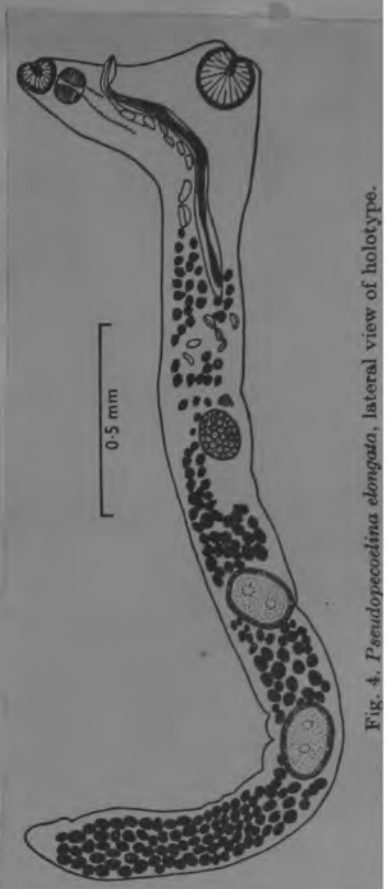


Fig. 4. *Pseudopecoelina elongata*, lateral view of holotype.

AHMAD, 1978

(a) *Pseudopecoelina puriensis* ~~sp. n.~~ (Fig. 1).

Host : *Therapon theraps* (Cuv. and Val.)

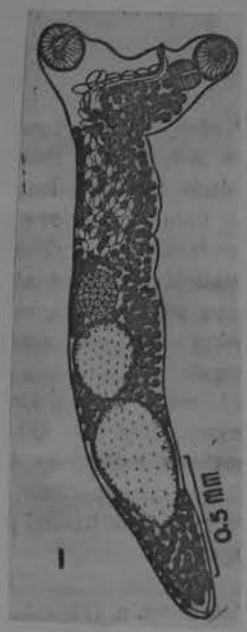
Site ; Small Intestine

Locality : Puri coast, Orissa

Number of specimens : Seven specimens from four hosts of 46 examined.

Specimens deposited : NO. MT 48 (Holotype); NO. MT 49 (Paratypes)

Discussion : Two species are known in the genus *Pseudopecoelina* Yamaguti, 1942 : *P. elongata* Hafeezullah, 1971. The new form differs from both these forms in having gonads contiguous, posterior testis much larger, a shorter posttesticular space, different sucker's ratio and vitellaria extending from the level of pharynx upto posterior extremity.



AHMAD, 1978

Pseudopecoelna stunkardi ~~sp. n~~. (Fig. 2)

Host : *Sciaena volgeri* (Bleeker)

Site : Small intestine

Locality : Puri coast, Orissa

Number of specimens : Twenty two specimens from six hosts of 48 examined.

Specimens deposited : NO. MT 50 (Holotype); NO. MT 51 (Paratypes)

Discussion : Of the three species known viz., *P. dampieriase*, *P. elongata* and *P. puriensis*, the new species differs from them in the extension of vitellaria from the level of intestinal bifurcation upto posterior extremity. It further differs from *P. dampieriae* in having ovary pre-equatorial, different shape and size of body, a long posttesticular space and circus sac reaching upto a little anterior to ovary; from *P. elongata* in not having vitellaria discontinuous in testicular and sparse in ovarian zone, ovary close to anterior testis, different sucker's ratio and from *P. puriensis* in having gonads separated, different sucker's ratio and in not having posterior testis much larger.

2

Pseudopecoelina xishaense ~~sp. nov.~~ (fig. 13) Gu and Shen, 1983

Six specimens were obtained from the intestine of one of three *Epinephelus kohleri* Schulz.

This species closely resembles *P. dambieriae* Yamaguti, 1942, but differs from it by the position of the testes which is relatively more anterior and contiguous, with a rather long cirrus sac, ovary and anterior testis being contiguous, smaller eggs and by host being an Epinephelus.

Xisha Islands, Guangdong Province, CHINA

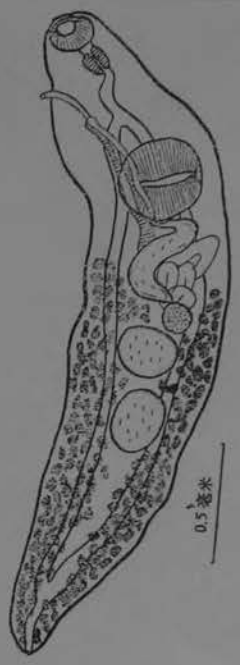


图 13 西沙伪孔腹吸虫(新种)
Pseudopecoelina xishaense sp. nov. 的腹

PSEUDOPECCELINA

Pseudopecoeloides Yamaguti, 1940

Generic diagnosis. — Allocreadiidae, Opecoelinae: Body slender, unarmed. Oral sucker ventroterminal, comparatively large; prepharynx distinct; pharynx well developed; esophagus short; ceca long and narrow, opening at posterior extremity into excretory vesicle to form cloaca which opens terminally. Acetabulum pedunculate, near anterior extremity, without tentacular appendages. No accessory sucker. Testes median, tandem, at or near middle of hindbody. Vesicula seminalis tubular, extending far back of base of acetabular peduncle. Cirrus pouch absent or rudimentary if present, enclosing pars prostatica and ductus ejaculatorius. Genital pore median or sinistral, posterior to oral sucker. Ovary median, pretesticular. No receptaculum seminis. Laurer's canal present. Uterus winding in intercecal field between preovarian shell gland and intestinal bifurcation. Vitellaria circumcecal, between vesicula seminalis and posterior extremity. Excretory vesicle reaching to ovary. Parasitic in intestine of marine fishes.

Genotype: *P. tenuis* Yamaguti, 1940 (Pl. 13, Fig. 163), in *Pseudopriacanthus nipponicus;* Hamazima, Japan. Also in *Trachurus novae-zelandiae* New Zealand; *Priacanthus hamrur;* Macassar.

Other species:

P. carangis (Yamaguti, 1938) Yamaguti, 1940 (syn. *Cymbephallus c.* Y.), in *Caranx mertens;* Inland Sea and Pacific coast of Japan. Also in *Selar crumenophthalmus*, Ecuador; *Caranx hippos*, Pacific coast of Mexico.

P. equesi Manter, 1947, in *Eques lanceolatus* and *E. acuminatus;* Florida.

P. gracilis Manter, 1947, in *Trachurops crumenophthalmus*, Florida.

Key to species of *Pseudopecoeloides* from Hawaiian fishes

1. Acetabulum nearly as large as oral sucker; vitellaria commencing immediately behind base of acetabular stalk; Laurer's canal opening dorsolateral to left cecum at level of ovary ..... *P. akule*
   Acetabulum definitely smaller than oral sucker; vitellaria commencing at variable distances posterior to base of acetabular stalk 2
2. Body markedly slender 3
   Body not markedly slender 4
3. Laurer's canal opening dorsolateral to ovary ..... *P. tenuoides*
   Laurer's canal opening dorsal to left cecum at level of anterior end of ovary or vitelline reservoir ..... *P. boops*
4. Seminal vesicle cylindrical; Laurer's canal opening dorsolateral to left cecum; cirrus pouch present ..... *P. wekeula*
   Seminal vesicle claviform; Laurer's canal opening anterosinistral to ovary medial to left cecum; cirrus pouch absent ..... *P. parviacetabulatus*
   Seminal vesicle tubular; Laurer's canal opening dorsal to left cecum at level of anterior end of ovary; cirrus pouch absent ..... *P. opelu*

Allocreadiidae

PSEUDOPECOELOIDES Yamaguti,1940

"related to Opecoeloides Odhner,Anisoporus Ozaki and Genitocotyle Park. Body slender,unarmed. Oral sucker terminal, inclined ventrally. Prepharynx distinct. Pharynx well developed. Esophagus short. Ceca opening into excretory vesicle to form cloaca,which in turn opens terminally. Acetabulum pedunculate, without tentacular appendages,near anterior extremity. No accessory sucker. Testes median,tandem,smooth, at or near middle of hindbody. Vesicular seminalis tubular,more or less enlarged posteriorly, extending furthur backward than base of acetabulum. Cirrus pouch absent or rudimentary,inclosing pars prostatica and ductus ejaculatorius when present. Genital pore variable in heights behind oral sucker, midventral or sinistral. Ovary median,pretesticular,smooth. No receptaculum seminis. Laurer's canal present. Uterus coiled in intercecal field between preovarian shell gland and intestinal bifurcation. Vitellaria surrounding ceca between postacetabular region and posterior extremity. Excretory vesicle tubular,reaching to ovary. Parasites of marine fishes.

Genotype: Pseudopecoeloides tenuis Yamaguti,1940

Other species: P.carangis (Yamaguti,1938) Yamaguti,1940

P.gracilis Manter ~~in press~~ 1947

Yamaguti adds: Cymbephallus elongatus Yamaguti,1938 may posses a cloaca. If so, it should be transferred to Pseudopecoeloide but this is unable to determine on the original material owing to excessive development of the vitellaria at the posterior extremity. It is,however, very desirable to make out this point on fresh material or sections."

No acetabular papillae ?
No accessory suckers
cloaca present
Protuberant acetabulum

PSEUDOPECOELOIDES Yamaguti,1940

Body slender,unarmed. Prepharynx distinct; esophagus short. Ceca opening into excretory vesicle to form cloaca. Acetabulum pedunculate, without tentacular appendages, near anterior end. No accessory sucker. Testes median, tandem, smooth, at or near middle of hindbody. Seminal vesicle tubular, extending posterior to acetabulum. Cirrus sac absent or rudimentary, inclosing pars prostatica and ductus ejaculatorius when present. Genital pore at variable heights behind oral sucker, midventral or sinistral. Ovary median, pretesticular, smooth. Sem. rec. lacking; L.canal present. Vitellaria surrounding ceca between postacetabular region and posterior end. Excretory vesicle reaching to ovary. Parasites of marine fishes.

Type: P.tenuis Yamaguti,1940
P.carangis (Yamaguti,1938)

Pseudopecoeloides tenuis Yamaguti,1940

Body 7.5 to 8. by 0.5 to 0.54; constricted at levels of ovary and testes.
Forebody shorter than peduncle of acetabulum.
Oral sucker 0.21 to 0.225 wide; acetabulum 0.13 to 0.135 wide ?
Sucker ratio:
Testes sausage shaped, tandem, in middle third of hindbody; 0.2 to 0.21 mm. apart; anterior testis at midbody.
Seminal vesicle tubular,twisted, 0.1 mm in front of vitellaria in the type but intruding into vitelline zone for about half its length in the two paratypes.
Genital pore just behind oral sucker. Cirrus sac lacking.
Ovary elongate oval., 0.33 in front of anterior testis.
Eggs 54 to 60 by 33 to 39 u.
Vitellaria surrounding ceca but interrupted at the body constrictions; beginning in the type at about middle of anterior third of body but a little more anteriorly in the paratypes.
Excretory vesicle to posterior end of ovary.
Host Pseudopriacanthus nipponicus (Cuv. & Val.)
Japan; Mie Prefecture

Differs from Opecoeloides furcatus in absence of appendages on acetabulum and absence of accessory sucker.

5. *Pseudopecoeloides tenuis* Yamaguti, 1940

Habitat. Small intestine of *Priacanthus hamrur* (Bleeker)

Material and locality. 7 mature specimens fixed in acetic sublimate under slight cover glass pressure, stained and mounted in toto; Macassar.

Body 5.8 – 10.8×0.37 – 0.55 mm. Oral sucker 0.22 – 0.33×0.21 – 0.3 mm. Prepharynx up to 75 μ long. Pharynx 0.12 – 0.15×0.11 – 0.156 mm. Esophagus up to 0.15 mm long. Ceca opening into excretory vesicle at posterior extremity. Acetabulum oval, with slit-like aperture, 0.09 – 0.12×0.11 – 0.156 mm, retracted into its peduncle, latter 0.25 – 0.6 mm long, 0.065 – 0.12 mm in diameter at its narrowest part, with fine circular wrinkles unless it is extended, containing powerful retractor of acetabulum.

Testes elliptical, fusiform or rhomboid, 0.62 – 0.81×0.26 – 0.35 mm, 0.025 – 0.32 mm apart from each other; anterior testis at or near midbody; posterior testis at posterior end of middle third of body or at its junction with posterior third. Vesicula seminalis 0.3 – 0.55×0.08 – 0.12 mm, reaching as far back as middle of anterior third of body, or a little more posteriorly. Genital pore at level of posterior end of oral sucker.

Ovary ovoid to elliptical, 0.23 – 0.35×0.15 – 0.22 mm, pre-equa-

rial, 0.11 – 0.7 mm in front of anterior testis. Uterus more intricately coiled posteriorly than anteriorly; eggs 48 – 60×33 – 39 μ. Vitelline follicles extending along ceca from about middle of anterior third to posterior extremity, interrupted on each side of shell gland or ovary and testes.

Yamaguti, 1953.

25. **Pseudopecoeloides tenuis** Yamaguti, 1940

HOST: *Trachurus novae-zelandiae* (Richardson), horse mackerel; stomach, intestine and caeca.

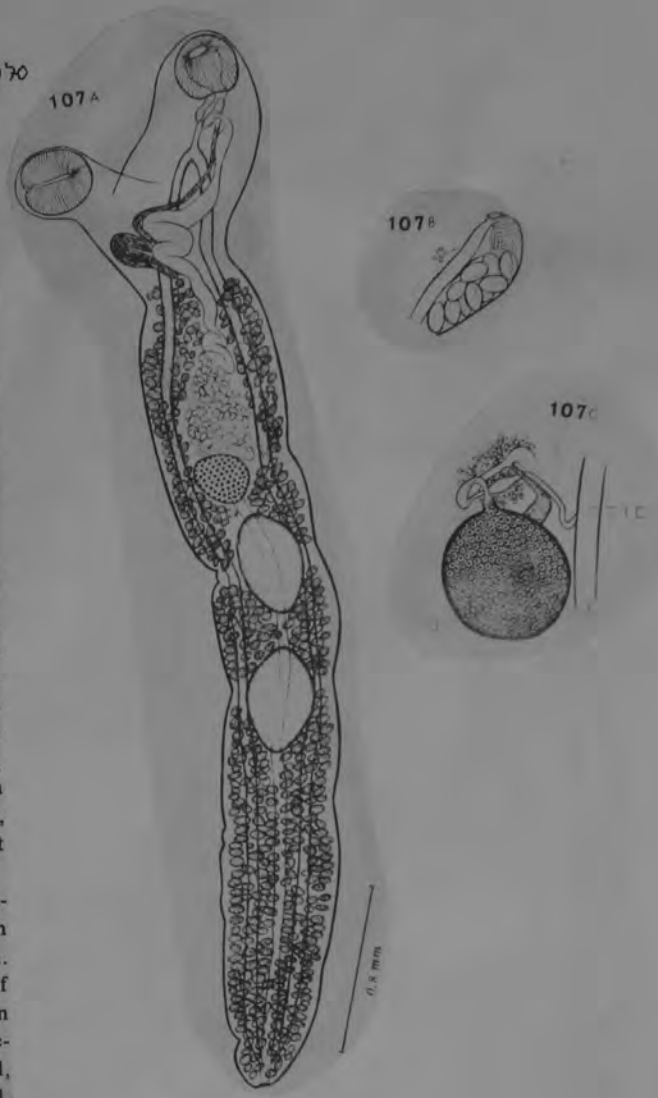
LOCALITY: Wellington.

SPECIMEN DEPOSITED: U.S. Nat. Mus. Helminth. Collection No. 49163.

DISCUSSION: Six specimens of this thread-like trematode were collected. They agreed almost perfectly with Yamaguti's *P. tenuis* reported from *Pseudopriacanthus nipponicus* in Japan. Egg size in my material was 49 to 68 by 34μ, extending variation in length somewhat; uncollapsed eggs were relatively wider than indicated by Yamaguti's measurements. *Pseudopecoelus gracilis* Manter, 1947 from *Trachurops crumenophthalma* at Tortugas has a much larger acetabulum; *P. carangi* (Yamaguti, 1938) Yamaguti, 1940 from *Caranx mertensi* in Japan has uninterrupted vitellaria.

Yamaguti (1953) reports *P. tenuis* from *Priacanthus hamrur* at Macassar, Celebes.

93. *Pseudopecoeloides akule* ~~n. sp.~~ Yamaguti, 1970
(Fig. 107)



HABITAT: Intestine of *Trachurops crumenophthalmus* (local name "akule"); Hawaii.

HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63715.

DESCRIPTION (based on 21 whole mounts): Body subcylindrical, smooth, more or less tapered posteriorly, 3.5-7.5 mm long, up to 0.2-0.7 mm wide at level of gonads or uterus. Oral sucker subterminal, surmounted by preoral lobe, 0.15-0.34 × 0.16-0.36 mm; prepharynx 40-110 μ long; pharynx 0.08-0.19 × 0.08-0.17 mm; esophagus simple, 50-150 μ long; ceca opening sideways into excretory vesicle near its posterior end by narrow anal canals. Acetabulum 0.2-0.37 mm anteroposteriorly, 0.2-0.43 mm transversely, without tentacular appendages; acetabular stalk 0.2-0.5 mm long, with its base near middle of anterior third of body.

Testes oval to elliptical, or somewhat fusiform, tandem, separated by vitelline follicles, 0.28-0.65 × 0.12-0.4 mm; anterior testis always in middle third of body, but posterior testis usually at junction of middle with posterior third of body, occasionally in middle third. Seminal vesicle tubular, winding, swollen (up to 50-110 μ) posteriorly, may or may not extend into anteiror vitellarian zone, tapered and straightened out anteriorly. Cirrus pouch rudimentary or absent. Pars prostatica cylindrical, 45-60 × 20-28 μ; cirrus cylindrical, simple, 58-70 × 20-28 μ. Common genital pore slightly to left at level of pharynx.

Ovary subglobular, 0.16-0.31 × 0.1-0.3 mm, pre-equatorial, median or slightly submedian, a short distance in front of anterior testis. Shell gland complex pre-ovarian. Laurer's canal opening dorsal to left cecum at level of ovary. Uterine coils confined to intercecal field between ovary and intestinal bifurcation; metraterm well developed distally, alongside male terminalia. Eggs oval, 49-60 × 32-42 μ in life. Vitelline gland circumcecal, extending between base of acetabular stalk and posterior extremity, usually interrrupted at level of testes, sometimes opposite ovary. Excretory vesicle tubular, usually reaching to posterior end of ovary, receiving anal canals near its terminal pore.

DISCUSSION: This species differs from *Pseudopecoeloides gracilis* Manter, 1947 from the same host species of the Atlantic in size of body and eggs. In *P. gracilis* the body length is less than 2 mm and most eggs measured 61-66 μ in length.

94. *Pseudopecoeloides boops* ~~n. sp.~~ Yam., 1970
(Fig. 108)

HABITAT: Intestine of *Priacanthus boops*; Hawaii.

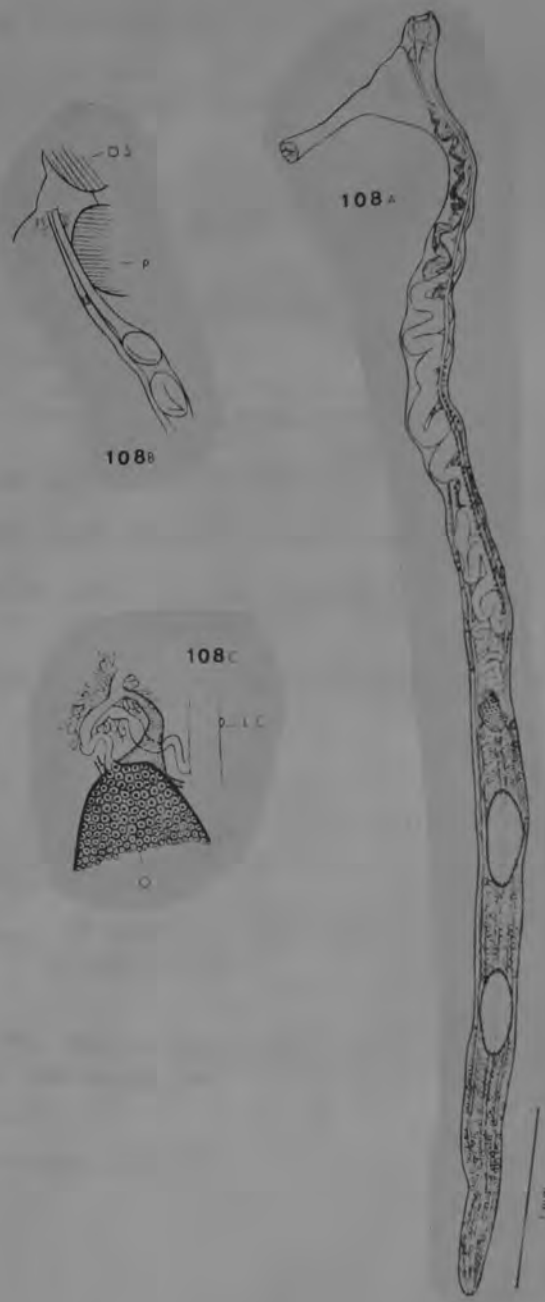
HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63716.

DESCRIPTION (based on ten whole mounts): Body slender, attenuated in postacetabular region, 4.5-7.5 mm long, 0.28-0.47 mm wide at level of testes or uterus. Forebody shorter than acetabular peduncle which is up to 0.7-mm long. Oral sucker terminal, 0.16-0.24 X 0.12-0.24 mm; prepharynx distinct; pharynx 60-120 X 90-140 μ. Esophagus 0.1-0.15 mm long, bifurcating at base of acetabular peduncle; ceca forming cloaca at extreme posterior end of body. Acetabulum 0.1-0.15 X 0.1-0.15 X 0.1-0.16 mm, long-stalked, near anterior extremity, telescoped into its stalk in most of the specimens examined.

Testes elliptical to fusiform, 0.2-0.7 X 0.18-0.37 mm; anterior testis more or less posterior to middle of body; posterior testis confined to, or largely in, caudal third of body even in contracted specimens. Seminal vesicle tubular, winding, 0.4-0.65 mm long lineally, 30-70 μ wide, commencing some distance anterior to vitellarian zone, with its narrower anterior portion strongly winding; pars prostatica not distinctly differentiated; straight ejaculatory duct opening outside ventral to pharynx, surrounded by accompanying cells at distal end. No definite cirrus pouch.

Ovary oval, 0.14-0.26 X 0.09-0.22 mm, distinctly post-equatorial, only equatorial in contracted specimens, but never pre-equatorial. Laurer's canal originating from germiduct before the latter joins the vitelline reservoir, running transversely, not turning backward before opening dorsal to left cecum at level of anterior end of ovary or vitelline reservoir. Uterus winding forward in intercecal field; metraterm not well differentiated; eggs oval, 55-63 X 32-37 μ in life. Vitelline follicles commencing at different levels in posterior part of anterior third of body, interrupted opposite ovary and testes, confluent in posttesticular field as well as in space between ovary and anterior testis and between two testes. Vitelline reservoir overlapping anterior part of ovary on its dorsal side. Excretory vesicle tubular, reaching to ovary; cloacal pore often very prominent.

DISCUSSION: This species differs from the most closely related *Pseudopecoeloides tenuis* Yamaguti, 1940 from *Pseudopriacanthus nipponicus* of Japan and *P. tenuoides* Martin, 1960 from *Priacanthus cruentatus* of Hawaii in the relative location of the ovary and testes. In the latter two species the anterior testis is equatorial and the ovary is constantly pre-equatorial, in strong contrast with the present species. In this respect *P. boops* resembles *P. wekeula* n. sp. from *Mulloidichthys*, but the testes are nearer the posterior extremity in *P. boops* than in *P. wekeula*, and the body is much longer and more slender in *P. boops*, although the egg size is nearly the same. In differentiating related species I would like to point out the importance of differences in the ralative position of the ovary and testes, which is almost always constant for each species unless the body is strongly contracted.



Allocreadiidae

Pseudopecoeloides
Cymbephallus carangi (Yamaguti, 1938) Yamaguti, 1940

Length: 1.25-2.54 mm.

Width: 0.22-0.38 mm.

Oral sucker: Subterminal, 0.125-0.188 X 0.14-0.2 mm.

Acetabulum: (size:) 0.11-0.16 X 0.125-0.188 mm. , with short
(position): peduncle slightly shorter than forebody.

Sucker ratio:

Esophagus: Short, bifurcates at base of peduncle of acetabulum.
Pharynx: 0.1-0.138 X 0.08-0.11 mm.

Genital pore (location): Sinistral, at level of prepharynx or pharynx
Testes, shape: Usually longitudinally elongated oval.
location: One immediately behind the other, occassionally separated a little by intervening vitelline follicles.
Cirrus sac (extent):
Ovary, shape: Subglobular, 0.075-0.15X 0.075-0.114 mm.

location: Median, pretesticular, equatorial or preequatorial.

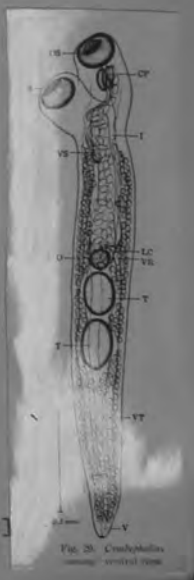
Vitellaria: Follicles commencing behind base of acetabular peduncle, confluent behind posterior testis, leaving posterior extremity free.
Eggs: Ellipsoidal, 60-72 X 33-35 μ, with a small knob at antiopercular pole.
Other features:

Host: Caranx mertensi Cuv. et Valenc.

Locality: Tarumi, Hyogo Prefecture, Japan.

Reference: Studies on the Helminth Fauna of Japan. Part 21. Trematodes of Fishes, IV. Kyoto, Japan
Comparisons: None.

Life cycle: Yamaguti in 1940 found the ceca connect with the ex. vesicle and transferred this species to this genus Pseudopecoeloides Yamaguti, 1940



f3568pl

13. ***Pseudopecoeloides carangis*** **(Yamaguti, 1938) Yamaguti, 1940.**

Examination of the additional material from *Caranx mertensi* Cuv. et Valenc. from Tarumi and *C. equula* Temm. et Schleg. from Hamazima compelled me to extend the range of variation given previously for the present species. The species may therefore be defined as follows.

Body rather slender, 1.2 – 5 × 0.15 – 0.5 mm; forebody short, hindbody long, tapering posteriorly to a more or less pointed end. Oral sucker 0.095 – 0.26 mm in diameter. Pharynx 0.07 – 0.138 × 0.063 – 0.15 mm. Esophagus 0.06 – 0.2 mm long. Acetabulum 0.08 – 0.2 mm in diameter, with long peduncle. Testes 0.12 – 0.48 × 0.075 – 0.35 mm; vesicula seminalis 35 – 114 μ wide. Ovary 0.06 – 0.25 × 0.075 – 0.26 mm. Eggs 60 – 75 × 30 – 54 μ.

Literature.

Yamaguti, S., Studies on the helminth fauna of Japan. Part 21. Trematodes of fishes, IV. Published by the author, 49 - 50, 1938. — Yamaguti, S., Studies on the helminth fauna of Japan. Part 31. Trematodes of fishes, VII. Jap. Jour. Zool. 9 (1), 35 & 108, 1940

Pseudopecoeloides carangis (Yamaguti, 1938) Yamaguti, 1940

SYNONYM: *Cymbephallus carangi* Yamaguti, 1938.

HOST: *Sphyraena jello* (Sphyraenidae).

HABITAT: Small intestine.

LOCALITY: Puerto Princesa, Palawan Island, Philippines.

DATE: 20 May 1962.

SPECIMEN DEPOSITED: USNM Helm. Coll. No. 37892.

DESCRIPTION (based on one specimen): Body 1,720 by 330, posterior extremity truncate; forebody 285, hindbody 1,290, posttesticular space 222; oral sucker 99 by 83; acetabulum 145 by 159, completely retracted into body, stalked, no papillae; sucker length ratio 1:1.46; prepharynx length 22, pharynx 68 by 71, esophagus length 121, ceca opening into excretory bladder; anterior testis 203 by 148, posterior testis 222 by 150; acetabulum to anterior testis 560, to posterior testis 770, to posterior extremity of external seminal vesicle 375; ovary 102 by 77, pretesticular, acetabulum to ovary 465; vitellaria uninterrupted opposite gonads, acetabulum to vitelline fields 24 to 46; four eggs 72 to 76 by 41 to 47. Extra ovary present, diameter 73, submedian, dextral, between testes, in contact with posterior testis, slightly overlapping anterior testis ventrally. > NOTE

DISCUSSION: This species was first described as *Cymbephallus carangi* from *Caranx mertensi* from Japan by Yamaguti (1938). He (1940) added new data from specimens from the same host, and transferred it to his newly created genus *Pseudopecoeloides*. Manter (1940) reported this parasite under its original name from *Selar crumenophthalmus* from Ecuador. Von Wicklen (1946) recorded it from *Polynemus octonemus* from the Gulf of Mexico. Manter (1947) noted its presence in *Caranx bartholomaei* and *C. ruber* from Tortugas, Florida. Yamaguti (1951) recorded it again from *Caranx mertensi* and from *C. equula*.

FROM FISCHTHAL AND KUNTZ, 1964

– OVER

Pseudopecoeloides carangi (Yamaguti, 1938) Yamaguti, 1940

Synonym: Cymbephallus carangi Yamaguti, 1938.

Hosts: **Caranx crysos* (C); *C. ruber* (C, J). CURAÇAO, JAMAICA

Site: intestine.

FROM NAHNAS AND CABLE (1964)

50. Pseudocoeloides equesi n. sp. Manter, 1947

Fig. 39

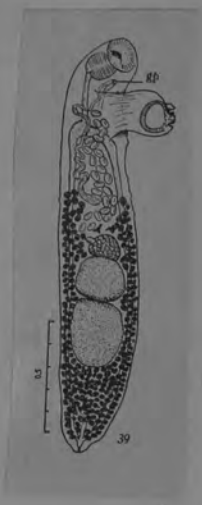
HOSTS: *Eques lanceolatus* (Linn.), ribbonfish, type host; in 1 of 7 hosts examined. *Eques acuminatus* (Bloch & Schneider), ribbonfish; in 3 of 9 hosts examined.

LOCATION: Intestine.

Description (based on 6 specimens): Body elongate, smooth except for a few irregularly scattered small papillae along the anterior half; about equally wide along most of its length, tapering to a rounded point at each end. Length 1.282 to 1.935 mm, width 0.225 to 0.375 mm. Oral sucker slightly wider than long, 0.126 to 0.160 mm in transverse diameter; acetabulum rather small, protrusible on a body stalk or retractile into body; 0.102 to 0.153 mm in transverse diameter, smaller than oral sucker; sucker ratio from 1:0.84 to 0.90. Anterior lip of acetabulum with 3 papillae, posterior lip with 2 papillae. Forebody from 1/4 to 1/6 body length. Pharynx large, 0.094 to 0.119 mm long by 0.088 to 0.127 mm wide, width only slightly less than length; esophagus somewhat longer than pharynx; intestinal bifurcation dorsal to acetabular stalk; ceca entering excretory vesicle near posterior end to form a uroproct.

Genital pore slightly to left of midline, opposite middle of pharynx. Testes large, smooth, tandem, contiguous, just posterior to midbody; posterior testis larger. There is a short muscular cirrus; cirrus sac lacking; seminal vesicle a coiled tube extending halfway between acetabulum and ovary. Ovary spheroid, anterior to and contiguous with anterior testis; seminal receptacle lacking; uterus preovarian; eggs 51 to 60 by 29 to 34 μ (62 by 38 μ in a living specimen); metraterm slightly longer than combined cirrus and prostatic vesicle. Vitellaria from about the base of seminal vesicle to posterior end of body, closely crowded; lateral, ventral, and dorsal to the ceca; filling posttesticular space. Excretory pore terminal.

Discussion: This species does not agree with the generic diagnosis of *Pseudopecoeloides* in that it possesses acetabular papillae. It is like *Opecoeloides* except an accessory sucker is lacking. The species is much like *P. carangis* (Yamaguti, 1938) except for the acetabular papillae. The papillae are definite in number in all 6 specimens of *P. equesi* collected. If the presence of these papillae should be considered a generic character, this species would belong to a new genus related to *Opecoeloides* and *Pseudopecoeloides*.



over

Pseudopecoeloides equesi Manter, 1947 (FIGURE 92)

Host: *Eques acuminatus*.
Site: intestine.

Locality: Cabo Rojo, P. R.
Deposited specimen: No. 39366.

Pseudopecoeloides equesi Manter, 1947
(Figure 52)

Host.—*Stellifer* sp. [new host record].

Location.—Intestine.

Locality.—Bella Vista, Panama City, Panama.

Discussion.—The paratype specimens of *P. equesi* show the posterior testis to be larger than the anterior testis but this difference is not considered important enough to warrant two species although it may represent geographical variation. *P. equesi* has been reported heretofore only from *Eques lanceolatus* and *Eques acuminatus* at Tortugas, Florida. It is another example of a species occurring in related hosts in the two oceans.

Sogandares, 1959

Pseudopecoeloides equesi Manter, 1947
Hosts: Eques acuminatus (C); **E. punctatus* (C). CURAÇAO
Site: intestine.

Pseudopecoeloides gracilis Manter, 1947
Host: Selar crumenophthalmus (J). JAMAICA
Site: intestine
FROM NAHHAS AND CABLE (1964)

Pseudopecoeloides equesi Manter, 1947
Host: Equetus acuminatus (3 of 3).
Site: Intestine.
Discussion: The acetabulum may be larger than the oral sucker rather than smaller as described by Manter (1947:291). The cuticle, especially on and near the acetabular stalk and the terminal portion of the body, is ringed with minute striae bearing numerous pointed projections.

From: Overstreet, 1969

49. Pseudopecoeloides gracilis n. sp. Manter, 1947

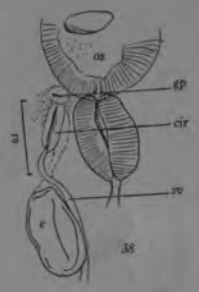
Figs. 37, 38

HOST: *Trachurops crumenophthalma* (Bloch), goggle-eye jack; in 4 of 5 hosts examined.

LOCATION: Intestine.

Description: Body elongate, rather slender, smooth, more or less pointed posteriorly, widest at acetabular level. Size (of 10 specimens measured) 1.296 to 1.989 by 0.202 to 0.352 mm. Length from 5.3 to 6.7 times the width. Forebody short, usually contracted, 0.187 to 0.240 mm or about 1/9 body length. Posttesticular space relatively long, 0.382 to 0.690 mm, from 28 to 36% of body length, usually 34 or 35% of body length. Oral sucker 0.097 to 0.122 mm in diameter; acetabulum 0.210 to 0.260 mm in diameter; sucker ratio 1:2 to 1:2.2. Acetabulum usually retracted into body, someimes protuberant; without definite papillae, sometimes with irregularly puckered edge. Pharynx length 0.060 to 0.080 mm; width 0.049 to 0.076 mm; esophagus about same length as pharynx; bifurcation near anterior edge of acetabulum; ceca enter excretory vesicle near excretory pore. Genital pore slightly to the left, opposite base of oral sucker or anterior edge of pharynx. Testes smooth, subglobular to elongate, intercecal, tandem, not contiguous but separated by at least a few vitelline follicles. In all but 1 of 27 specimens the follicles extended across the body between the testes; in the one specimen the follicles almost met. Genital atrium (Fig. 38) small, globular, thick-walled. Cirrus (Fig. 38) thick-walled, cylindrical; cirrus sac lacking; seminal vesicle sinuous, extending only a short distance posterior to acetabulum (not over 1/3 distance to the ovary). Ovary subglobular, smooth, near midbody, immediately anterior to anterior testis. Vitellaria from posterior edge of acetabulum to posterior end of body, extending between testes, usually interrupted opposite posterior testis, filling posttesticular space. Eggs 53 to 70 by 29 to 39 μ. Such a range is due largely to unusually small eggs, 53 by 29 μ in one specimen. 28 eggs measured from 9 other specimens showed no egg less than 58 μ long and most eggs were 61 to 66 μ in length. Excretory vesicle a long tube extending forward to the ovary.

37



Comparisons: P. gracilis differs markedly from the other two species in the genus, *P. tenuis* Yamaguti, 1940 and *P. carangis* (Yamaguti, 1938), in that the acetabulum is twice as large as the oral sucker. It is most like *P. carangis* differing in sucker ratio and in having more vitellaria between the testes. *P. gracilis* is very similar to the "*C. vitellosus*" of Linton, 1940, p. 82 and fig. 18, from the goggler, *T. crumenophthalmus* at Woods Hole, Massachusetts, except that acetabular papillae occured in Linton's material. Various species studied by the author indicate that these acetabular papillae are more constant than Linton believed but observations on living specimens are desirable.

Pseudopecoeloides gracilis Manter, 1947

Host.—*Selar crumenopthalmus* (Bloch), goggle-eyed scad; *Apogon binotatus* (Poey), cardinal fish.

Location.—Mid-intestine of *S. crumenopthalmus* and 3/4 intestine of *A. binotatus*.

Locality.—Off Lerner Laboratory Pier, N. Bimini, B.W.I.

NAHHAS AND CABLE (1964) REPORT THIS SPECIES FROM SELAR CRUMENOPHTHALMUS INTESTINE – AT JAMAICA.

Sogandares, 1959

95. *Pseudopecoelioides opelu* ~~n. sp.~~ Yam., 1970
(Fig. 109)

HABITAT: Intestine of *Decapterus pinnulatus* (local name "opelu"); Hawaii.

HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63717.

DESCRIPTION (based on 25 whole mounts): Body slender, subcylindrical, blunt-pointed at both extremities, 1.4-3.6 mm long, 0.14-0.4 mm wide in region of uterus. Oral sucker terminal, with subterminal aperture, 0.06-0.19 × 0.06-0.2 mm; prepharynx distinct; pharynx 50-150 × 50-140 μ; esophagus 0.12-0.27 mm long; ceca open outside separately, one on each side of the excretory pore by a narrow anal canal when the posterior end of the body is protruded, but form a cloaca when this posterior end is retracted. Acetabulum pedunculate, 0.06-0.15 mm in transverse diameter, without tentacular appendages; acetabular stalk up to 0.3-0.32 mm long, arising anterior to middle of anterior third of body.

Testes elliptical, 0.15-0.45 × 0.08-0.35 mm, tandem, contiguous or separate; anterior testis usually at junction of middle with posterior third of body, occasionally a little more anteriorly. Seminal vesicle tubular, up to 40-100 μ wide, extending into zone of anterior end of vitellaria. No distinct cirrus pouch; pars prostatica poorly differentiated. Genital pore sinistral to pharynx.

Ovary oval to subglobular, 30-150 × 20-150 μ, post-equatorial, contiguous with anterior testis or a little in front of it. No seminal receptacle. Laurer's canal passing transversely anterodorsal to vitelline reservoir and turning backward before opening dorsal or dorsolateral to left cecum at level of vitelline reservoir. Uterus coiled anterior to ovary, straightened out as it approaches the acetabular stalk. Eggs oval to elliptical, 46-63 × 30-46 μ in life. Vitelline follicles circumcecal, commencing on each side at junction of anterior with middle third of body or a little more anteriorly or posteriorly, usually interrupted at level of testes, sometimes at level of ovary too, intruding into space between ovary and anterior testis or between two testes, confluent in posttesticular field; vitelline reservoir immediately anteriodorsal to ovary. Excretory vesicle reaching to ovary. Cloacal aperture terminal.

DISCUSSION: This species resembles *Pseudopecoelioides boops* n. sp. in the posterior position of the testes but differs from it markedly in body length. In *P. opelu*, but not in *P. boops*, the Laurer's canal turns backward before opening dorsally.

96. *Pseudopecoeloides parviacetabulatus* ~~n. sp.~~ Yamaguti, 1970

(Fig. 110)

HABITAT: Intestine of *Trachurops crumenophthalmus* (local name "akule"), associated with *Pseudopecoeloides akule*; Hawaii.

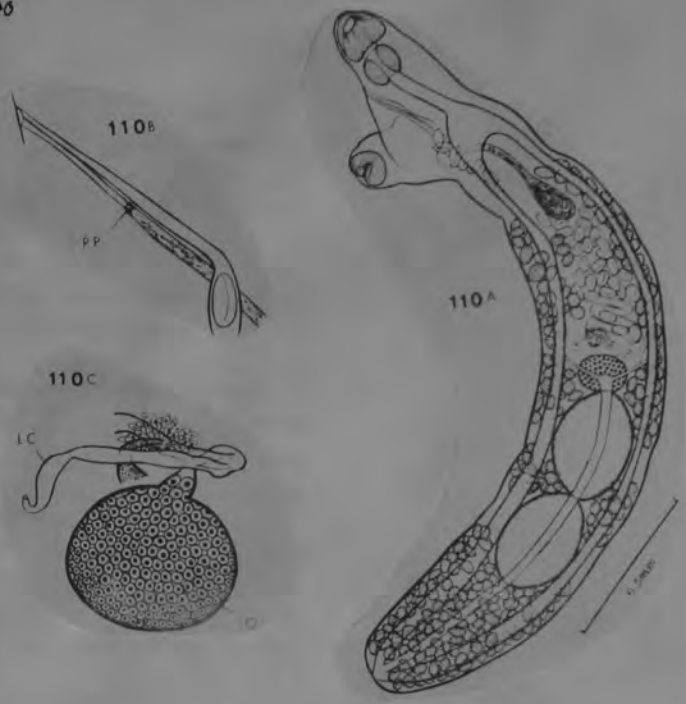
HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63718.

DESCRIPTION (based on five whole mounts): Body subcylindrical, unarmed, 2.4-3.3 mm long, 0.34-0.4 mm wide at about middle of hindbody. Oral sucker terminal, 0.14-0.16 X 0.15-0.2 mm; prepharynx present; pharynx 0.09-0.13 X 0.1-0.13 mm; esophagus wide, 80-150 μ long; ceca joining at posterior extremity with excretory pore. Acetabulum distinctly pedunculate, 0.1-0.12 mm anteroposteriorly, with base of its peduncle just anterior to middle of anterior third of body. Sucker ratio 1.3-1.5:1.

Testes oval to elliptical, 0.2-0.5 X 0.15-0.24 mm, directly tandem; anterior testis at posterior end of middle third of body, posterior one at anterior end of posterior third of body. Seminal vesicle elongate claviform, 60-100 μ in maximum width posteriorly, with its posterior end at or near junction of anterior with middle third of body, attenuated anteriorly into very narrow duct, with intermission of small pars prostatica; ejaculatory duct joining metraterm at genital pore ventral to pharynx. No trace of cirrus pouch.

Ovary subglobular, 0.11-0.15 X 0.13-0.16 mm, just postequatorial, contiguous with anterior testis. Laurer's canal arising from germiduct as the latter turns back on itself in front of the ovary, crossing transversely anterodorsal to ovary, opening dorsally near left margin of ovary. Shell gland complex immediately anterior to ovary. Uterus winding forward in intercecal field; metraterm straight alongside ejaculatory duct. Eggs oval, 46-56 X 32-39 μ in life. Vitellaria extending along ceca from level of seminal vesicle to posterior extremity; vitelline reservoir anterodorsal to ovary. Excretory vesicle reaching to ovary; cloacal pore terminal.

DISCUSSION: This species differs from the most closely related *Pseudopecoeloides akule*, with which it was found associated in the same host fish, in the acetabulum being always definitely smaller than the oral sucker. In *P. akule* the acetabulum is never smaller than the oral sucker. The specific name refers to the small acetabulum.



Pseudopecoeloides scomberi ~~sp.nov~~. (Fig. 5) Hafeezullah, 1971

HOST. *Scomberoides tol* (Cuv. and Val.); slender queenfish; Carangidae.

SITE. Intestine.

NUMBER OF SPECIMENS. 3.

LOCALITY. Tuticorin, Gulf of Manaar.

DESCRIPTION (with measurements on two good specimens). Body 6·828–7·056 mm long, 0·504–583 mm wide, elongate; forebody short, tapering anteriorly; hind body long, subcylindrical. Cuticle smooth. Acetabulum 218–236 long, 215–225 deep, on short peduncle, without papillae. Oral sucker 212–221 long, 206–221 deep, subglobular, ventroterminal. Length of sucker ratio 1:1. No accessory sucker. Prepharynx short; pharynx 120–135 × 123–143, globular; oesophagus indistinct; caecal bifurcation probably slightly anterior to acetabular peduncle; caecae simple, joining excretory vesicle near posterior end to form a uroproct.

Testes 265–324 × 209–240, oval, entire, tandem, separated from each other, in middle third of hind body. Cirrus sac inconspicuous, enclosing cirrus and short *pars prostatica*. Seminal vesicle tubular, long, winding; *pars prostatica* indistinct; cirrus long, protrusible; genital pore sinistral to median line, ventral, at posterior level of pharynx. Post-testicular space 2·324–2·511 mm.

Ovary 180 × 166, entire, median, in front of anterior testis. Seminal receptacle absent. Vitellaria follicular, continuous, reaching slightly short of acetabular peduncle; lateral in pretesticular region and confluent posterior to testes; vitelline reservoir immediately anterior to ovary. Uterine coils pre-ovarian. Eggs 54–72 × 30–42. Excretory vesicle tubular, extending to ovary.

Pseudopecoeloides scomberi resembles *P. carangis* (Yamaguti, 1938) Yamaguti, 1940 but differs from it in having a more cylindrical body, a larger body size; a wide separation of the testes and ovary (close together in *P. carangis*), a more posterior position of genital pore and in the shape of the oral sucker.

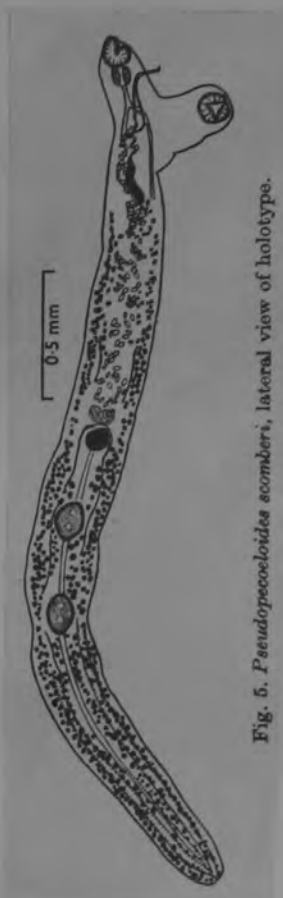


Fig. 5. *Pseudopecoeloides scomberi*, lateral view of holotype.

97. *Pseudopecoeloides tenuoides* Martin, 1960
(Fig. 111)

HABITAT: Intestine of *Priacanthus cruentatus* and *Acanthurus nigroris*; Hawaii.

DESCRIPTION (based on 20 whole mounts): Body slender, unspined, constricted at level of ovary and testes, 2.7-10.8 X 0.15-0.5 mm. Oral sucker 0.21-0.36 X 0.18-0.32 mm; prepharynx distinct; pharynx 70-150 X 70-120 μ long; ceca united posteriorly and opening into terminal cloaca. Acetabulum 0.07-0.14 X 0.1-0.17 mm, with two internal pads as described and figured by Martin (1960); acetabular peduncle 0.25-0.45 mm long.

Testes fusiform, 0.2-0.47 X 0.07-0.22 mm, tandem, in middle third of body, rarely contiguous. Seminal vesicle tubular, 40-50 μ wide, winding between anterior end of vitellaria and intestinal bifurcation. No cirrus pouch. Common genital pore ventral to pharynx. Ovary elongate oval, 0.09-0.27 X 0.05-0.23 mm, in anterior part of middle third of body. No seminal receptacle. Laurer's canal originating at the point where the winding germiduct turns back on itself anterolateral to the ovary, opening dorsally at level of ovary. Uterine coils confined to intercecal field between ovary and intestinal bifurcation. Eggs oval, 44-58 X 25-37 μ in life. Vitellaria beginning a little posterior to, or at level of, posterior end of seminal vesicle and terminating at posterior extremity, interrupted at levels of ovary and testes, confluent in posttesticular median field. Excretory vesicle tubular, reaching to ovary.

DISCUSSION: In the original description of this species Martin (1960) states that the prostatic cells are fairly numerous, but I have been unable to detect either pars prostatica or prostate cells,

Pseudopecoeloides tenuoides n. sp.
Figs. 10, 11 Martin, 1960

SPECIFIC DIAGNOSIS: Based on eight specimens. Body elongate, slender, smooth, somewhat constricted at gonad levels, 2.555–5.04, av. 3.47 long, and 0.16–.5, av. 0.3 wide; oral sucker subterminal 0.22–.28, av. 0.243 long, and 0.18–.23, av. 0.193 wide; acetabulum pedunculate .050, av. 0.044 long, and 0.025–.037, av. 0.030 wide; vitellaria well developed beginning a little posterior to the seminal vesicle and extending to near the posterior end of body, interrupted at gonad levels; testes spindle-shaped, smooth, tandem, anterior testis 0.187–.336, av. 0.267 long and 0.093–.146, av. 0.115 wide, posterior testis 0.218–.348, av. 0.292 long, and 0.093–.124, av. 0.111 wide; seminal vesicle tubular with a coiled narrow duct; prostate cells fairly numerous; cirrus rudimentary, a cirrus sac was not observed; genital opening ventral, sinistral, approximately midway between suckers; excretory vesicle tubular extending to or near ovary, opening terminally as a cloaca.

HOST: *Priacanthus cruentatus* (Lacépède). Four of seven fish infected; maximum number of worms, four.

LOCATION: Intestine.

LOCALITY: Kaneohe Bay, Oahu, Hawaii.

TYPE SPECIMEN: *Pseudopecoeloides tenuoides*, deposited as no. 5613, Hancock Parasitology Collection.

Pseudopecoeloides tenuoides is closest to *P. tenuis*, described by Yamaguti (1940) from the small intestine of *Pseudopriacanthus nipponicus* (Cuv. et Valenc.), collected at Hamazima, Mie Prefecture, Japan. *P. tenuoides* differs from *P. tenuis* in having smaller eggs, a smaller oral sucker, smaller acetabulum, and in having acetabular pads.

FIG. 10. *Pseudopecoeloides tenuoides*.
FIG. 11. *P. tenuoides*, acetabulum showing pads.

ith thick pads, 0.068–.118, av. 0.098 long, and .087–.109, av. 0.096 wide; prepharynx short; harynx 0.087–.124, av. 0.1 long, and 0.65–.081, v. 0.068 wide; esophagus up to two-thirds ength of pharynx; ceca proceed laterally and osteriorly to unite with excretory bladder near osterior end of body; gonads in middle third f body; ovary pretesticular, oval to spindle-haped, smooth, 0.131–.211, av. 0.18 long, and .062–.143, av. 0.096 wide; Mehlis gland im-ediately anterior to ovary; Laurer's canal pres-nt; seminal receptacle lacking; uterine coils ainly between ovary and seminal vesicle; me-

98. *Pseudopecoeloides wekeula* ~~n. sp.~~

(Fig. 112) Yamaguti, 1970

HABITAT: Intestine of *Mulloidichthys auriflamma* (type host, local name "wekeula") and *M. samoensis*; Hawaii.

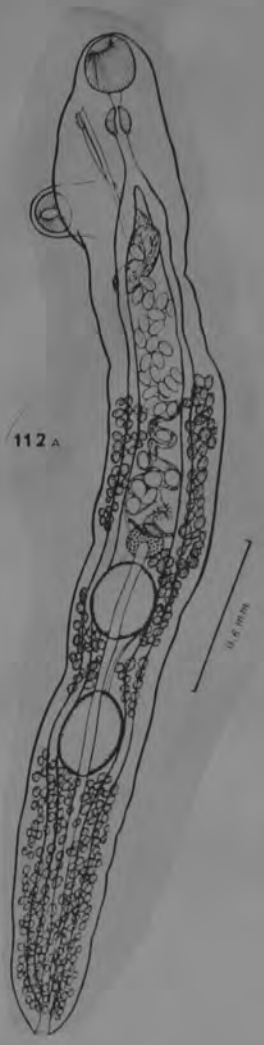
HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63719.

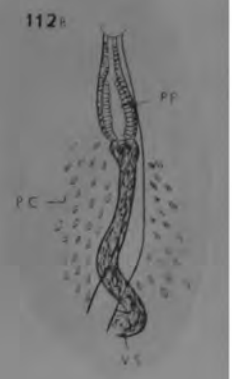
DESCRIPTION (based on 42 whole mounts): Body elongate, subcylindrical, blunt-pointed at both extremities, 1.5-4.8 × 0.18-0.5 mm. Oral sucker ventroterminal, 0.1-0.21 × 0.1-0.2 mm; prepharynx 20-90 μ long; pharynx 50-150 × 50-140 μ; esopahgus variable in length; ceca opening at posterior extremity, one on each side of excretory pore, but opening into cloaca when the posterior extremity is retracted. Acetabulum pedunculate, 70-130 × 95-160 μ, without tentacular appendages; acetabular peduncle 0.1-0.4 mm long, arising a little in front of middle of anterior third of body.

Testes subglobular to oval, 0.1-0.37 × 0.07-0.32 mm separated one from the other by vitellaria, may be contiguous in contracted specimens; anterior testis usually at posterior part of middle third of body; posterior one in anterior part of posterior third of body. Seminal vesicle tubular or cylindrical, curved, tapering anteriorly, 20-100 μ wide at its base which reaches a short distance farther back of the base of the acetabular stalk and may or may not intrude into the vitellarian zone. Cirrus pouch thin-walled, elongate oval, 70 × 35 μ in the type, containing prostatic complex and short cirrus. Male genital pore opening ventrally near left margin of body together with female pore at level of anterior end of pharynx.

Ovary subglobular, 40-130 × 40-150 μ, equatorial or postequatorial, with shell gland complex immediately in front. Seminal receptacle absent. Laurer's canal opening dorsal or dorsolateral to left cecum at level of ovary. Uterus loosely coiled in intercecal field between shell gland and intestinal bifurcation; metraterm alongside cirrus pouch, opening very close to male pore on its left side. Eggs oval, 51-70 × 32-49 μ in life. Vitellaria circumcecal, commencing on each side at or behind junction of anterior with middle third of body, may or may not be interrupted at level of ovary and testes, terminating at posterior extremity, leaving extreme posterior end of body free; vitelline reservoir overlapping ovary anterodorsally or anterolaterally. Excretory vesicle tubular, reaching to dorsal side of ovary; cloacal pore terminal.

DISCUSSION: This species differs distinctly from the most closely related *Pseudopecoeloides tenuoides* Martin, 1960 from *Priacanthus cruentatus* of Hawaii in the relative location of the ovary and the testes, as well as in egg length. The presence of a thin-walled cirrus pouch is worth noting.





PSEUDOPECOELOIDES

Pseudopecoelus von Wicklen, 1946
Syn. *Cymbephallus* Linton, 1934, partim

Generic diagnosis. — Allocreadiidae, Opecoelinae: Body smooth, elongate. Oral sucker subterminal, followed by prepharynx. Pharynx small, esophagus short, ceca terminating blindly at posterior extremity. Acetabulum embedded in body or projecting, without papillae. Testes tandem, sometimes slightly oblique, postequatorial. Seminal vesicle tubular, long, winding, reaching further back of acetabulum. Pars prostatica and cirrus short, both may be enclosed in sheath-like structure. No true cirrus pouch or prostate gland. Gential pore to left of pharynx or esophagus. Ovary median or submedian, pretesticular. No receptaculum seminis. Laurer's canal present. Uterus winding forward from ovary; eggs medium-sized to rather large. Vitellaria follicular, extending in lateral fields of hindbody, occasionally intruding into forebody. Excretory vesicle tubular, extending to ovary. Gastrointestinal parasites of marine fishes.

Genotype: *P. vulgaris* (Manter, 1934) in *Ancylopsetta dilecta, Bellator barbata, Helicolenus dactylopterus, Loemonema barbatulum, Peristedion imberbe, P. miniatum, P. platycephalum, Pontinus longispinus, Pionotus alatus, P. stearnsi, Pronotogrammus* sp., *Scorpaena cristulata;* Florida. Also in *Helicolenus percoides;* New Zealand.

Other species:

P. barkeri Hanson, 1950, in *Holocentrus ascensionis;* Bermuda.

P. brevivesiculatus Hanson, 1955, in *Cantherines pardalis, Melichthys buniva;* Honolulu.

P. elongatus (Yamaguti, 1938) von Wicklen, 1946 (syn. *Cymbephallus e.* Y.) in *Scombrops boops;* Maisaka, Japan. Also in *Holocentrus ascensionis;* Bermuda.

P. gibbonsiae Manter et Van Cleave, 1951, in *Gibbonsia metzi;* California.

P. hemilobatus Manter, 1954, in *Cyttus australis;* New Zealand.

P. japonicus (Yamaguti, 1938) von Wicklen, 1946 (syn. *Cymbephallus j.* Y.) (Pl. 14, Fig. 171), in *Sayonara satsumae, Polymixia japonica, Zenopsis nebulosus, Nemichthys* sp., *Ateleopus japonicus Sirembo imberbis, Synagrops japonica, Chlorophthalmus albatrosis, Pseudorhombus pentophthalmus, Aulopus japonicus, Chelidoperca hirudinacea;* encysted in peribuccal connective tissues of *Trachurus trachurus;* Suruga Bay, Japan. Also in *Centriscops humerosus;* New Zealand.

P. priacanthi (MacCallum, 1921) Manter, 1947 (syn. *Allocreadium p.* M.) in *Priacanthus arenatus* and *P. cruentatus;* Florida.

P. tortugae von Wicklen, 1946 (syn. *Cymbephallus fimbriatus* Linton, 1934, of Manter, 1934), in *Coelorhynchus carminatus* or *Chalinura occidentalis;* Florida.

P. umbrinae Manter et Van Cleave, 1951, in *Umbrina roncador;* California.

PSEUDOPECOELUS Von Wicklen,1946

Body smooth, elongated; acetabulum usually protrusible, never papillated; anus lacking, ceca end blindly; muscular genital pore located well anterior to the acetabulum and to the left of pharynx; testes tandem; cirrus sac greatly reduced or lacking; cirrus short and muscular; prostate gland lacking; seminal vesicle tubular and not enclosed in the cirrus sac; vitellaria from region of acetabulum to posterior end; ovary pretesticular; uterus preovarian; seminal receptacle lacking; eggs medium-sized to large. Parasites of marine fishes.

Type species: Pseudopecoelus vulgaris (Manter,1934) Von Wicklen

Other species: Pseudopecoelus japonicus (Yamaguti,1938) VonW.
Pseudopecoelus elongatus (Yamaguti,1938) VonW.
Pseudopecoelus tortugae VonWicklen,1946
Syn. Cymbephallus fimbriatus of Manter,1934
P. Barkeri Hanson,1950
P. gibbonsicus Manter & Vandeave,1950
P. umbrinae " " " "

Key to species of *Pseudopecoelus* from Hawaiian fishes*

1. Acetabulum not pedunculate; testes lobed 2
   Acetabulum pedunculate; testes unlobed 3
2. Seminal vesicle tubular, winding, ending dorsal to acetabulum; Laurer's canal opening dorsal to anterior testis . . . . . *P. vitellozonatus*
   Seminal vesicle cylindrical or claviform, not winding, ending dorsal to acetabulum; Laurer's canal looped sinistral to ovary and opening anterosinistral to ovary . . . . . *P. acanthuri*
   Seminal vesicle subcylindrical, ending at anterior end of acetabulum; Laurer's canal looped and opening anterosinistral to ovary . . . . . *P. puhipaka*
3. Acetabulum much larger than oral sucker, notched on each lateral margin; seminal vesicle tubular, convoluted at base of acetabular peduncle; testes far apart from posterior end of body; Laurer's canal winding distally and opening anterosinistral to ovary . . . . . *P. sphyraenae*
   Acetabulum smaller than oral sucker, not notched on each lateral margin; seminal vesicle saccular, posterior to acetabular peduncle; testes rather near posterior end of body; Laurer's canal opening dorsal to left cecum at level of anterior end of ovary . . . . . *P. maomao*

* Hanson (1955) reported *Pseudopecoelus brevivesiculatus* from *Cantherines pardalis* and *Mullichthys buniva* of Hawaii, but we missed this species.

Pseudopecoelus

~~Cymbophallus~~ vulgaris ~~n. sp.~~ (Manter, 1934) von Wicklen, 1946.

(Figs. 42-47)

Hosts	Frequency in hosts	Depth
Ancylopsetta dilecta (Goode & Bean)	4 of 8	60-125 fath.
Bellator militaris (Goode & Bean)	1 23	50
Bembrops gobioides (Goode)	3 28	200-250
Benthodesmus atlanticus Goode & Bean	1 1	300
Brotula barbata (Bloch & Schneider)	1 1	79-140
Helicolenus dactylopterus (de la Roche)	8 18	200-315
Læmonema barbatulum Goode & Bean	3 6	249-316
Peristedion imberbe Poey	6 17	100
Peristedion miniatum Goode	3 8	138-150
Peristedion platycephalum (Goode & Bean)	8 12	150
Pontinus longispinus Goode & Bean	9 18	60-149
Prionotus alatus Goode & Bean	3 4	60
Prionotus stearnsi Jordan & Swain	1 3	50
Pronotogrammus sp.	3 14	139-156
Scorpæna cristulata Goode & Bean	1 2	100
Unidentified	1 1	

Position—Intestine, rarely in the stomach.

Specific Diagnosis

Length 1.3 to 4.18 mm., width 0.32 to 0.95 mm. Body usually tapering posteriorly, hindbody flattened, body usually indented opposite testes. Ventral sucker from 2 to 3 times the diameter of oral sucker, somewhat extended transversely, with transverse aperture, from 1/4 to 1/6 body length from anterior end. Body folds, especially in the form of a lip-like anterior fold, developed in connection with ventral sucker, but no finger-like processes or papillæ. Prepharynx very short; esophagus long, usually about twice the length of pharynx, forking a short distance anterior to ventral sucker. Genital pore to the left opposite the posterior half of pharynx. Testes lobed, the posterior testis often bilobed, close together in posterior half of body. Posttesticular space variable but almost always longer than forebody. Cirrus short and wide; pars prostatica short; prostate gland lacking; seminal vesicle entirely external, tubular, extending posteriorly to a point about halfway between ventral sucker and ovary. Ovary lobed, 3 lobes directed posteriorly; uterine seminal receptacle; eggs variable in size but always relatively large, 90 to 127 by 50 to 76 μ. In very young individuals eggs may be as small as 78 by 40 μ but whenever eggs of 78 to 80 μ in length occur, the specimen can be recognized as young. Vitellaria from region of ventral sucker to posterior end, sometimes slightly interrupted opposite testes. Excretory vesicle simple, extending to about the level of ovary.

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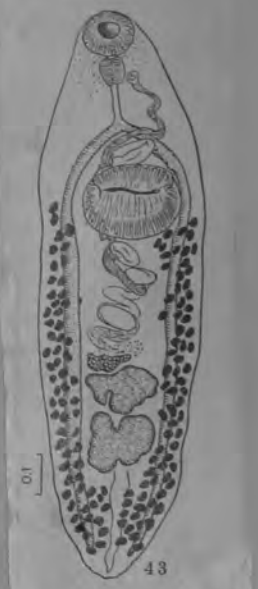

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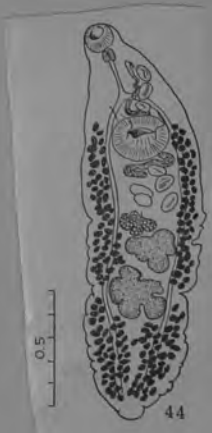

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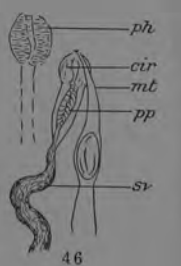

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Discussion

Considerable variation in structure makes this species somewhat confusing. The vitellaria, usually extending to the middle of the ventral sucker, may extend to the anterior border of the sucker, or may only reach the posterior border. All of 13 specimens from *Ancyclopsetta dilectum* were alike in that the vitellaria extended to the extreme anterior border of the ventral sucker. Specimens from *Peristedion imberbe* were more variable in this character, the vitellaria barely reaching the sucker, extending to midsucker, or to the anterior border. 4 specimens from *Læmonema* sp. from 300 fathoms differed in that the vitelline follicles were more dense (*i.e.* close together), impinging to some degree between the testes and ending abruptly at the posterior border of the ventral sucker. It hardly seems, however, that these characters (which vary so much in other specimens) could identify the form as a different species. It is, therefore, included as an example of *C. vulgaris*.

The specimens collected from *Pontinas longispinus* tended to be smaller in size, noticeably attenuated posteriorly, with ventral sucker occupying practically the entire diameter of the body and with the vitellaria ending at the posterior edge of the ventral sucker. Here, again, a separate species can not be safely indicated, due to the variation these same structures exhibit in specimens from other hosts. The tendency for such variations to be constant in individuals from a certain host species illustrates one of the problems of classification. The parasite seems to show a rather wide spread of variation in a host like *Peristedion imberbe*, but to attain a greater uniformity in some hosts like *Ancyclopsetta dilectum*, *Pontinas longispinus* and *Læmonema* sp. The possibility that several different species are involved are greatly lessened by the variations found within certain other hosts. The forms are therefore all included under one species. There may be some ground for the recognition of several varities.

After considerable observation of these trematodes, the species was eventually recognized chiefly by the position of the genital pore, the size of the eggs and the shape of the testes. Papillæ of the ventral sucker are clearly absent. The eggs are unusually large and distinguish the species from both of Linton's species.

22. **Pseudopecoelus vulgaris** (Manter, 1934) Von Wicklen, 1946

SYNONYM: *Cymbephallus vulgaris* Manter, 1934

HOST: *Helicolenus percoides* Richardson, sea perch; intestine and caeca.

LOCALITY: Portobello.

SPECIMEN DEPOSITED: U.S. Nat. Mus. Helminth. Collection No. 49161.

DISCUSSION: Four specimens were collected. They agree in almost all respects with *P. vulgaris* from sixteen different species of deepwater fishes at Tortugas, Florida, and particularly with a few specimens of *P. vulgaris* from *Helicolenus dactylopterus* in which the vitellaria are interrupted opposite the gonads. The only difference of possible significance is that the testes of the New Zealand specimens are not lobed except for a few slight irregularities. However *P. vulgaris,* as noted in its description, is rather variable and the specimens from *Helicolenus* in Florida show less lobing of the testes than usual. One of the most striking characters of this species is the very large egg size (nearly the size of the pharynx). Eggs in New Zealand specimens were 91 to 118 by 53 to 65μ being usually about 100μ long as in the Florida material. Such details as sucker ratio, length of oesophagus, position of genital pore, character of cirrus and seminal vesicle are the same in both collections. In many specimens of *P. vulgaris* it is not possible to determine whether the caeca end blindly or unite with the excretory vesicle. The point could not be determined for the specimens from *H. dactylopterus.*

I have previously noted (Manter, 1934, p. 295) the interesting bathymetric distribution of *P. vulgaris* at Tortugas. It was never collected from shallow water fishes; first appearing at about 60 fathoms, it becomes very common in many species of fishes at 100 fathoms and below so far as collections were made (316 fathoms). Its occurrence in New Zealand is another example of the far flung distribution of these cold water species of trematodes which, while not able to infect warm-water fishes a few fathoms above them, can be found in cold waters of either the northern or southern hemispheres thousands of miles away. *Helicolenus* is not typically a shallow-water fish but it does appear in quantity in the dredges of commercial fishermen off Campbell Point, an evidence of the proximity of deep water and the upwelling movements of oceanic waters in this region.

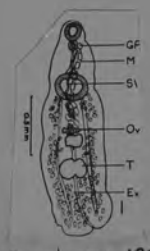
Manter 1954

Pseudopecoelus vulgaris (MANTER, 1934) VON WICKLEN, 1946.

SYNONYM : *Cymbephallus vulgaris* MANTER, 1934.
HOST : **Scorpaena scrofa* L. (Scorpaenidae).
SITE : Small intestine.
LOCALITY : Gorée, Senegal.
DATE : 23 March 1954.
SPECIMENS DEPOSITED : USNM Helm. Coll. No. 71897.

DISCUSSION : This species has been reported from a variety of marine fishes from Florida and New Zealand. Our collection consists of two adult specimens. The sucker length ratio is 1 : 1.71-1.90.

From Fischthal & Thomas, 1972



From LLOYD, 1938

***Pseudopecoelus vulgaris* (Manter, 1934) Von Wicklen, 1946**

Host: *Synaphobranchus affinis*.
Sites: Stomach and intestine.
Locality: Lat 26°10′ to 24′ N, long 79°37′ to 39′ W in 686 to 699 m (Straits of Florida).

DISCUSSION

Three specimens 1.87 to 3.81 mm long with sucker–width ratios 1:1.8 to 2.2 and eggs 116 to 130 μ long by 67 to 81 μ wide agreed with those described by Manter (1934) from 16 different hosts also caught in deep water off Florida. The same species has also been reported from fishes off New Zealand (Manter, 1954) and Senegal, West Africa (Fischthal and Thomas, 1972).

Overstreet & Martin, 1974

KEY TO THE SPECIES OF PSEUDOPECOELUS

1	(8)	Ovary lobed	2
2	(3)	Papillae on posterior lip of acetabulum	*P. hemilobatus*
3	(2)	No papillae on lips	4
4	(5)	Vitellaria extending anterior to acetabulum	*P. umbrinae* Manter and Van Cleave, 1951
5	(4)	Vitellaria not extending anterior to acetabulum	6
6	(7)	Acetabulum 2× to 3× oral sucker	*P. vulgaris* (Manter, 1934) Von Wicklen, 1946
7	(6)	Acetabulum only slightly larger than oral sucker	*P. japonicus* (Yamaguti, 1938) Von Wicklen, 1946
8	(1)	Ovary unlobed	9
9	(10)	Vitellaria extending anterior to acetabulum	*P. gibbonsiae* Manter and Van Cleave, 1951
10	(9)	Vitellaria not extending anterior to acetabulum	11
11	(12)	Vitellaria interrupted opposite gonads	*P. elongatus* (Yamaguti, 1938) Von Wicklen, 1946
12	(11)	Vitellaria not interrupted opposite gonads	13
13	(14)	Acetabulum notched laterally ..	*P. priacanthi* (MacCallum, 1921) Manter, 1947
14	(13)	Acetabulum not notched laterally	15
15	(16)	Testes not indented; eggs 44 to 51μ long	*P. barkeri* Hanson, 1950
16	(15)	Testes somewhat indented; eggs 57 to 66μ long	*P. tortugae* Von Wicklen, 1946

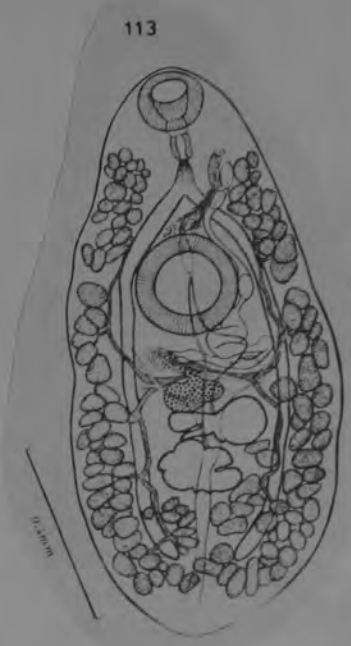
99. *Pseudopecoelus acanthuri* ~~n. sp.~~ Yam., 1970
(Fig. 113)

HABITAT: Gall bladder of *Acanthurus sandvicensis*; Hawaii.
HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63720.
DESCRIPTION (based on three whole mounts): Body elongate pyriform, flat, 1.0-1.26 mm in length, with maximum width of 0.5-0.57 mm in testicular zone. Cuticle thin, finely spinose. Oral sucker subterminal, 0.11-0.14 X 0.09-0.14 mm; prepharynx present; pharynx barrel-shaped, 45-50 X 40-65 μ; esophagus short, bifurcating about middle of anterior third of body; ceca approaching each other and terminating near posterior extremity. Acetabulum 0.15-0.21 mm in diameter, at junction of anterior with middle third of body. Sucker ratio 1:1.25-2.3.

Testes transversely elongated, irregularly lobed, 0.07-0.14 X 0.17-0.26 mm, situated a little obliquely tandem behind equator. Seminal vesicle cylindrical or claviform, up to 30-46 μ wide, attenuated or inflated as it crosses over left cecum ventrally, 0.1 mm long in the type, extending obliquely to dorsal side of anterior part of acetabulum. Pars prostatiea not differentiated; ejaculatory duct twisted, narrow. Cirrus pouch cylindrical or fusiform, 58-70 X 18-28 μ. Genital pore to left of esophagus.

Ovary transversely elongated, 50-90 X 120-160 μ, slightly to right of median line, giving rise to germiduct at middle of anterior margin; Laurer's canal forming a transverse loop near left end of ovary and opening on left side of median line at level of vitelline reservoir. No seminal receptacle. Uterus coiled between ovary and acetabulum medial to left cecum, running straight forward along left margin of acetabulum and seminal vesicle. Eggs oval, 53-59 X 30-33 μ in life. Vitelline follicles comparatively large, extending in extracecal fields and posttesticular intercecal area, commencing at level of pharynx or esophagus; vitelline reservoir compact, median or submedian, pre-ovarian. Excretory vesicle tubular, reaching to ovary; pore terminal.

DISCUSSION: This species differs from the closely related *Pseudopecoelus vitellozonatus* Pritchard, 1966 from Hawaiian fishes (*Naso unicornis* and *Holocentrus xantherythrus*) in the sucker ratio (1:1.25-2.3 vs. 1:1.0-1.25) and in egg sixe in life (53-59 X 30-35 μ vs. 63-74 X 42-56 μ). The terminal course of the Laurer's canal is also different – in *P. vitellozonatus* the canal extends backward to the dorsal side of the left part of the anterior testis, whereas in the present species it forms a transverse loop to the left of the ovary.



Sogandares, 1959

Pseudopecoelus barkeri Hanson, 1950

Host.—*Holocentrus ascensionis* (Osbeck), squirrelfish.

Location.—Pyloric cecum.

Locality.—Lerner Fish Pens, Bimini, B.W.I. [new locality record]; formerly known from the same host at Bermuda.

Hanson, 1950

13. *Pseudopecoelus barkeri* ~~n. sp.~~ (Fig. 8) Host: Squirrelfish, probably *Holocentrus ascensionis* (Osbeck).

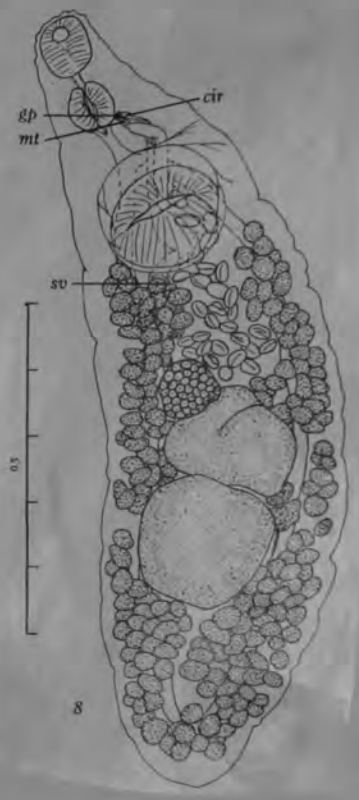
Description (based on 2 specimens).—Body unspined, elongated, 1.664 to 2.007 by 0.511 to 0.569 mm., wider and more bluntly rounded posteriorly. Oral sucker subterminal, 0.116 to 0.124 by 0.102 to 0.124 mm.; acetabulum nonpapillated, somewhat protrusible, 0.212 to 0.226 by 0.248 to 0.277 mm., $\frac{1}{4}$ to $\frac{1}{5}$ body length from anterior end, with transverse aperture; sucker ratio 1: 2.24 to 2.44. Prepharynx short, 0.012 to 0.026 mm. long; pharynx rounded, 0.105 to 0.124 by 0.092 to 0.102 mm.; esophagus 0.076 to 0.085 mm. long; ceca bifurcate anterior to acetabulum, terminate blindly near posterior end.

Testes large, ovoid, smooth, tandem; anterior testis 0.219 to 0.234 by 0.241 to 0.248 mm; posterior slightly larger, 0.241 to 0.263 by 0.247 mm.; posttesticular space approximately equal to forebody. Cirrus short, muscular; cirrus sac absent although longitudinal muscles located around cirrus; prostate gland lacking; seminal vesicle entirely external, extending posteriorly midway between ventral sucker and ovary, saccular posteriorly, tubular anteriorly. Ovary pretesticular, subglobular, smooth, 0.116 by 0.110 to 0.122 mm., adjacent to anterior testis, to right of median line; uterus loosely looped from mid-ovary to metraterm; metraterm muscular, approximately equal in length to cirrus. Genital pore to left opposite posterior half of pharynx. Vitelline follicles from posterior portion of acetabulum to very near posterior end; confluent posteriorly; dorsal, ventral and lateral to ceca. Eggs 44 to 51 by 31 to 34 μ (average, 48 by 31 μ). Excretory vesicle I-shaped, extending anteriorly almost to ovary.

Comparisons.—*P. barkeri* is distinguished from *P. priacanthi* (MacCallum, 1912) Manter, 1947 on the basis of the unnotched acetabulum, contiguous gonads, more median genital pore, smaller size, and much less numerous ova; from *P. elongatus* (Yamaguti, 1938) Von Wicklen, 1946 by its more pyriform shape, larger sucker ratio (1: 2.24 to 2.44 as compared with 1: 1.43 to 1.66), contiguous gonads and vitellaria, larger pharynx and shorter esophagus; from *P. japonicus* (Yamaguti, 1938) Von Wicklen, 1946 by its unindented testes and ovary, shorter esophagus, shorter cirrus, larger sucker ratio and smaller eggs; from *P. vulgaris* (Manter, 1934) Von Wicklen, 1946 by its unindented testes, globular ovary, and smaller eggs; and from *P. tortugae* Von Wicklen, 1946, which it resembles most closely, by its unindented testes, larger sucker ratio (1: 2.24 to 2.44 as compared with 1: 1.62), the presence of a metraterm, smaller but more robust size (1.66 to 2.01 by 0.51 to 0.57 mm. as compared with 2.94 by 0.67 mm.), and the fewer and smaller eggs (44 to 51 by 31 to 34 μ as compared with 57 to 66 by 39 to 44 μ).

14. *Genitocotyle atlantica* Manter, 1947. Host: Yellow grunt, probably *Haemulon sciurus* (Shaw). Location: Intestine.

15. *Plagioporus crassigulus* (Linton, 1910) Price, 1934. Host: Porgy, *Calamus* sp. Location: Intestine.



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Pseudopecoelus barkeri Hanson, 1950 (FIGURE 93)

Hosts: *Holocentrus ascensionis*, **Holocentrus vexillarius*.

Site: intestine.

Locality: Mona Island, P. R.

Deposited specimen: No. 39367.

Except in slightly smaller body size and distribution of vitellaria, the present material is in complete agreement with that described by Hanson (1950).

from Siddiqi + Cable, 1960


93

—over—

Pseudopecoelus barkeri Hanson, 1950
Hosts: *Holocentrus ascensionis* (C. J); *H. vexillarius* (C). CURAÇAO, JAMAICA
Site: intestine.

According to the key to the genus *Pseudopecoelus* given by Manter (1954), our specimens could be either *P. barkeri* Hanson, 1950, or *P. tortugae* (Manter, 1934). In general body shape and indented testes, they are more like *P. tortugae* but egg measurements (45-52 by 27-32 μ) are more like those of *P. barkeri*. The sucker ratio is intermediate (1:1.7-2.3). Thus the 2 species seemingly differ only in egg size.

FROM NAHHAS AND CABLE (1964)

Hanson, 1955

Pseudopecoelus brevivesiculatus n. sp. (Figs. 4 and 5)

HOSTS: *Cantherines pardalis* (Ruppell), file fish, (type host), in 1 of 7 specimens examined; *Melichthys buniva* (Lacépède), trigger fish, "humu-humu ele-ele", in 1 of 6 specimens examined.

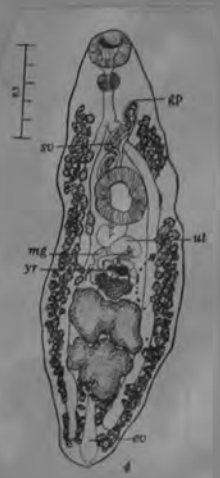
LOCATION: Intestine

TYPE SPECIMEN: U. S. Nat. Mus. Helm. Coll. No. 37463.

DESCRIPTION (based on 5 specimens): Body smooth, varying from pear-shape to elongate; tapered anteriorly, less tapered but more pointed posteriorly, widest at testicular-ovarian level; 1.416 to 2.409 mm. long by 0.767 to 0.898 mm. wide; shorter specimens proportionately wider than longer ones. Oral sucker terminal, well-developed, smaller than acetabulum, 0.190 to 0.219 mm. long by 0.204 to 0.219 mm. wide. Acetabulum about one-third body length from anterior end, strong, rounded, without papillae, opening varying from central and round to posterior and oval; 0.270 to 0.321 mm. long by 0.284 to 0.299 mm. wide. Sucker ratio 1:1.22 to 1.57. Prepharynx short, pharynx rounded, 0.073 to 0.088 mm. long by 0.073 to 0.110 mm. wide; esophagus muscular, 0.058 to 0.183 mm. (usually about 0.1 mm.) long, and relatively wide (about 0.05 mm.); ceca relatively narrow, about same width as esophagus, extending parallel to body wall to near posterior end of body, ending blindly. Genital pore sinistral, midway between esophagus and body wall. Testes tandem, intercecal, irregularly lobed, contiguous, in posterior third of body length; anterior testis 0.204 to 0.321 mm. long by 0.409 to 0.511 mm. wide; posterior testis 0.219 to 0.350 mm. long by 0.365 to 0.445 mm. wide. External seminal vesicle saccular; in all except one specimen, a sharp curve in posterior half; reaching anterior edge of acetabulum which it may overlap slightly; passing ventral to left cecum, entering cirrus sac without noticeable constriction, then narrows and coils two or three times before terminating in non-muscular ejaculatory duct which joins uterus at genital pore. Cirrus sac short, indistinct, a very thin membrane surrounding a few prostatic cells (Fig. 5). Ovary median, pretesticular, trilobed or subtriangular, with more or less prominent conical extension on median anterior surface, close to and in some cases contiguous with anterior testis, 0.088 to 0.131 mm. long by 0.183 to 0.234 mm. wide. Uterus usually not reaching posterior to mid-ovary although in one specimen it reaches middle of anterior testis; originating as narrow tube which loops several times and becomes very muscular before expanding into two or three enlarged loops posterior to acetabulum and continuing without loops dorsal to acetabulum and ventral to left cecum to genital pore; a few scattered gland cells found in parenchyma near terminal portion of uterus. Mehlis' gland large, diffuse, to right of midline; anterior, dorsal and slightly posterior to ovary, reaching laterally nearly to cecum. Seminal receptacle absent; sperm cells present in posterior portion of uterus. Vitellaria follicular, extending from level of genital pore to posterior to cecal ends, mostly lateral to ceca, converging medianly posterior to testes and just posterior to acetabulum; follicles may be interrupted once or twice but interruptions not consistent; vitelline ducts conspicuous; yolk reservoir just anterior to ovary. Eggs relatively few, usually collapsed, 54 to 68μ by 26 to 37μ, usually 58 to 61μ by 28 to 34μ. Excretory pore terminal; excretory vesicle I-shaped and extending dorsally and medianly to, or slightly anterior to, ovary.

COMPARISONS: This species has the generic characters of *Pseudopecoelus*, namely: smooth body; acetabulum without papillae; no accessory sucker; ceca ending blindly; very reduced cirrus sac; and tubular seminal vesicle. However, the cirrus is non-muscular and more aptly described as an ejaculatory duct, and the genital pore is non-muscular.

P. brevivesiculatus differs from all species of *Pseudopecoelus* except *P. umbrinae* Manter & VanCleave, 1951 and *P. gibbonsiae* Manter & VanCleave, 1951 in that the vitellaria extend well anterior to the acetabulum, and from all except *P. umbrinae* in that the seminal vesicle does not extend posterior to the acetabulum. It further resembles *P. umbrinae* in its 3 or 4 lobed ovary, absence of a metraterm, and egg size. It differs from *P. umbrinae* in shorter post-testicular space, smaller sucker ratio, location of the genital pore, lobed testes which are always tandem, its weakly developed cirrus sac, median ovary, more lateral distribution of the vitellaria which may converge posterior but *not anterior* to the acetabulum, and the slightly more anterior extent of the excretory vesicle.



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5

Hawaii

Opecoelidae

Pseudopecoelus elongatus (Yamaguti, 1938) Von Wicklen, 1946

SYN. 39. *Cymbephallus elongatus* ~~n. sp.~~ YAMAGUTI, 1938

Three mature specimens were obtained from the small intestine of *Scombrops boops* (Houttuyn) at Maisaka, Siduoka Prefecture, October 22, 1936. Two of them were injured at the posterior part of the body, and the other selected as type was fixed in completely relaxed state, so that the following diagnosis is subject to later emendation.

Body elongate, 3.55 mm long by 0.36 mm broad, tapering anteriorly; hindbody flattened, with nearly parallel sides and rounded extremity, indented opposite testes and shell gland when contracted. Cuticle unarmed. Subcuticular longitudinal muscle strongly developed. Cervical glands on either side of anterior end of esophagus; their ducts opening outside along anterodorsal margin of oral sucker. Latter subterminal, 0.14-0.18 mm in diameter. Prepharynx distinct. Pharynx 63-96×75-84 μ. Esophagus 0.1-0.3 mm long. Ceca narrow, reaching to near posterior end of body. Acetabulum very prominent, 0.2-0.3 mm in diameter, at posterior half of anterior third of body. In the type as well as in one paratype it is embedded in the body and surmounted anteriorly by a circular fold of the body wall, but projects prominently in the other paratype. Testes ovoid, entire, 0.26-0.41×0.23-0.34 mm, exactly median, tandem, at posterior half of middle third of body. Vesicula seminalis sinuous posteriorly, not reaching to the point halfway between acetabulum and ovary. Pars prostatica cylindrical, cirrus short; both enclosed in feebly muscular sheath. Genital atrium small, lined with thick cuticle, opening in left submedian line at level of pharynx. In the type the genital pore lies immediately behind the level of the pharynx, while in a contracted paratype it is on a level with the anterior end of the pharynx. Ovary rounded, median, just pre-equatorial and 0.17 mm in diameter in the type. Laurer's canal opening dorsally in left submedian line at level of anterior end of ovary. Shell gland and ootype immediately in front of ovary. Uterine coils intercecal, between shell gland and acetabulum. Metraterm provided with well developed circular muscle fibers. Eggs oval, light brown, thick-shelled, 54-60×33-36 μ. Vitellaria extending around ceca from behind acetabulum to posterior extremity, interrupted opposite shell gland, ovary and testes. In the post-testicular area occupying one-third of the body length the follicles of the two sides are separated by a narrow median field but confluent at the posterior extremity. Excretory vesicle tubular, reaching to posterior end of ovary, where it sends out on each side a collecting vessel running forward to divide at the level of the acetabulum into an ascending and a descending tubule.

This species resembles *C. fimbriatus* Linton of Manter in the extent of the vitellaria, but differs from it in the shape of the testes, the position of the genital pore, etc.

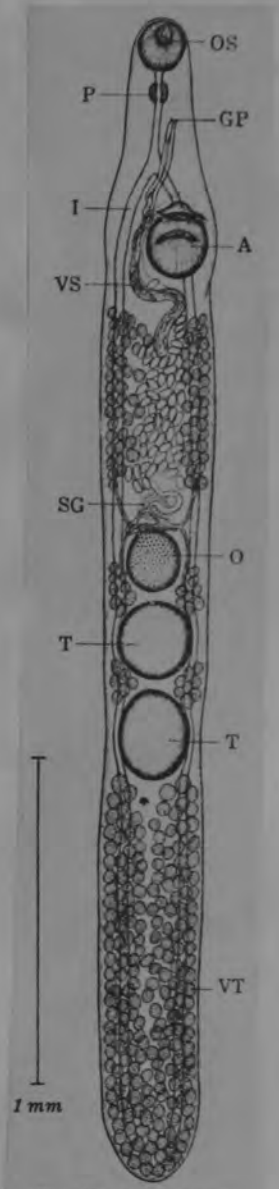


Fig. 30. *Cymbephallus elongatus*; ventral view.

- over -

Opecoelidae

Pseudopecoelus elongatus (Yamaguti, 1938) Wicklen, 1946
(Est. 8, figs. 23-27)

Cymbephallus elongatus Yamaguti, 1938: 50-51, **fig. 30**
Cymbephallus elongatus Yamaguti, 1940: 108
Pseudopecoelus elongatus Wicklen, 1946: 159, 161
Pseudopecoelus elongatus Manter & Van Cleave, 1951: 322, 323

Pseudopecoelus elongatus Yamaguti, 1954: 112
Pseudopecoelus elongatus Manter, 1954: 507
Pseudopecoelus elongatus Yamaguti, 1958: 170
Pseudopecoelus elongatus Skrjabin & Petrov, 1958: 296, 304, fig. 96
Pseudopecoelus elongatus Skrjabin, 1964: 131

Trematódeos com corpo alongado, extremidades arredondadas e cutícula não espinhosa; medem 2,45 a 6,13 mm de comprimento por 0,43 a 0,51 mm de largura. Ventosa oral subterminal, com 0,12 a 0,17 mm de comprimento por 0,14 a 0,17 mm de largura. Acetábulo saliente, pedunculado, ou embebido no corpo; mede 0,18 a 0,27 mm de comprimento por 0,23 a 0,27 mm de largura. Relação entre a ventosa oral e o acetábulo varia de 1:1,51 a 1:1,70. Pré-faringe presente, curta. Faringe musculosa, com 0,092 a 0,149 mm de comprimento por 0,075 a 0,125 mm de largura. Esôfago relativamente curto. Cecos intestinais mais ou menos retilíneos, atingindo a extremidade posterior do corpo. Poro genital submediano, na zona da faringe. Átrio genital curto. Bôlsa do cirro ausente. Vesícula seminal presente, pós-acetabular; mede 0,13 a 0,30 mm de comprimento por 0,07 a 0,08 mm de largura, ligando-se a um canal ejaculador sinuoso, de aproximadamente 0,77 mm de comprimento por 0,02 mm de largura. Cirro curto, inaparente. Testículos pós-acetabulares, pós-ovarianos, intercecais, com campos quase totalmente coincidentes e zonas um pouco afastadas. Testículo anterior com 0,20 a 0,30 mm de comprimento por 0,21 a 0,27 mm de largura; testículo posterior com 0,15 a 0,33 mm por 0,22 a 0,25 mm. Ovário intercecal, pós-acetabular e pré-testicular, no campo dos testículos e com zona um pouco afastada da do testículo anterior; mede 0,12 a 0,17 mm de comprimento por 0,13 a 0,17 mm de largura. Glândula de Mehlis pré-ovariana. Espermateca ausente. Canal de Laurer presente. Útero com espermatozóides em suas alças iniciais; é pré-ovariano e quase todo intercecal, ligando-se ao átrio genital por uma vagina não diferenciada. Ovos amarelos, operculados, com 0,060 mm de comprimento por 0,033 a 0,040 mm de largura. Vitelinos constituídos por folículos numerosos e arredondados, estendendo-se do limite posterior da zona da vesícula seminal até a extremidade posterior do corpo; são extracecais, cecais e intercecais, interrompidos ao nível das gônadas e ocupam a área intercecal pós-testicular. Poro excretor terminal. Vesícula excretora não observada.

Habitat — Estômago e intestino de **Selene vomer** L.

Proveniência — Escola de Pesca Caboclo Bernardo, Santa Cruz (Oceano Atlântico, Estado do Espírito Santo, Brasil.

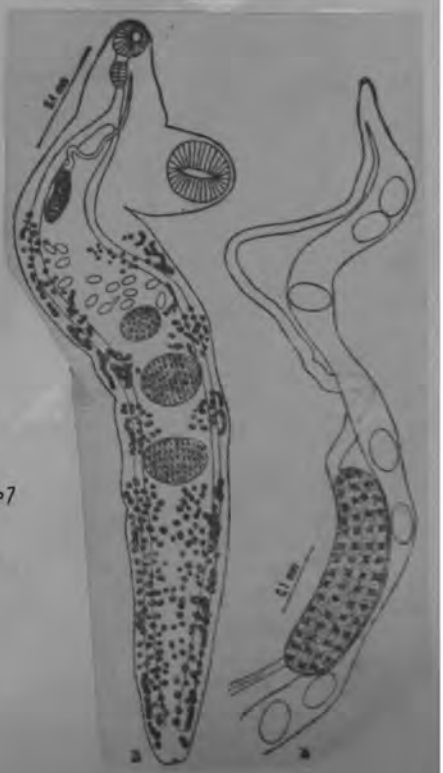
Material estudado depositado na Coleção Helmintológica do Instituto Oswaldo Cruz sob os números 30 031, 30 032 e 30 068.

No Quadro II damos as principais medidas de três espécimes.

Na descrição original dessa espécie Yamaguti diz que o átrio genital é submediano, ao nível da faringe, porém a figura publicada mostra o átrio genital situado mais abaixo, ao nível do esôfago.

Descrita de 3 exemplares colhidos no intestino delgado de **Scombrops boops** (Hottuyn) em Misaka, Siduoka Prepectures, no Japão, é registrada por Yamaguti, em 1958, na Bermuda, parasitando **Holocentrus ascensionis.**

Assinalâmo-la agora em nôvo hospedador, no Atlântico sul.



From Travassos, Freitas and Bührnheim, 1967

From Fischthal & Kuntz, 1970

***Pseudopecoelus ghanensis* sp. n.**
(Figs. 3–4)

HOST: *Cynoscion macrognathus* (Bleeker), large-mouth weakfish (Sciaenidae).

HABITAT: Small intestine.

LOCALITY: Tema, Cape Coast; Ghana.

DATE: 8 December 1965 (Cape Coast).

SPECIMENS: USNM Helm. Coll. No. 70670 (holotype); No. 70671 (paratype).

DIAGNOSIS (based on two adult worms): Body elongate, robust, unspined, with protuberance bearing acetabulum, extremities round, 1,000–2,500 by 295–575 at ovarian level. Forebody conical, 140–235 long; hindbody much wider than forebody, 735–1,720 long; forebody–hindbody length ratio 1:5.3–7.3. Oral sucker subterminal ventral, longitudinally elongate, 87–125 by 73–120; acetabulum transversely elongate, aperture a transverse slit, without papillae, 125–205 by 140–230, center at level of anterior one-seventh to one-fifth body length. Sucker length ratio 1:1.44–1.64, width ratio 1:1.92–1.93. Prepharynx 21 long (in larger specimen); pharynx nearly round, 48–68 by 56–66; esophagus 120 long (in larger specimen); cecal bifurcation dorsal to acetabulum; ceca terminating blindly 72–80 from posterior extremity.

Testes two, somewhat lobed to notched, longitudinally to transversely elongate, intercecal but may overlap ceca dorsally, oblique, contiguous, lying in posterior part of middle third of body or extending slightly into posterior third; anterior testis sinistromedian, 140–240 by 181–206, lying 191–465 postacetabular; posterior testis median to dextromedian, 176–230 by 152–285, lying 298–670 postacetabular; posttesticular space 257–820 long. Cirrus sac absent. Seminal vesicle bipartite; proximal part saccular, straight, entirely postacetabular, commencing 75–222 postacetabular or approximately halfway between ovary and acetabulum; anterior part tubular, narrow, sinuous. Pars prostatica preacetabular, cell lined, 42 by 33 (in larger specimen). Cirrus short, muscular, opening into shallow genital atrium. Genital pore at sinistral part of pharynx.

Ovary anterodextral to and contiguous with anterior testis, smooth, diagonally or transversely oval, 80–157 by 95–145, lying 167–445 postacetabular. Oviduct emerging from anteriormost margin of ovary. Ootype complex anteromedian to ovary and anterior testis. Uterus short, intercecal, coiling between ovary-anterior testis and acetabulum. Metraterm thick walled, approximately same length as pars prostatica. Vitelline follicles large, round to oval in shape, usually extending from posterior part of acetabulum (or one field more posteriorly) to posterior extremity, filling posttesticular space, in lateral fields anteriorly and completely or partially surrounding ceca. Vitelline reservoir dorsomedian to ovary. Eggs yellowish, operculate, usually collapsed in mounted specimens, seven measuring 50–59 by 33–38.

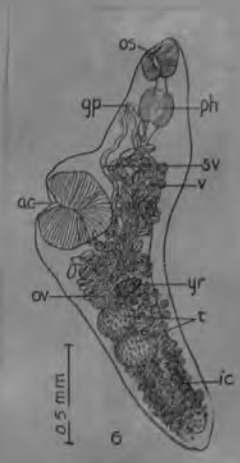
Excretory bladder unbranched, tubular, extending anteriorly to ovary; pore terminal.

DISCUSSION: From Cape Coast, a single specimen was recovered from one of 10 *C. macrognathus* examined. Ten small-mouth weakfish, *C. brachygnathus* (Bleeker) from the same area were negative. Our new species appears closest to *P. scorpaenae* (Manter, 1947) Overstreet, 1969, from scorpaenid fishes from Florida, *P. barkeri* Hanson, 1950, from holocentrid fishes from Bermuda, Bimini, Puerto Rico, Jamaica, and Curaçao, *P. umbrinae* Manter and Van Cleave, 1951, from sciaenid fishes from California, and *P. manteri* Sogandares and Hutton, 1959, from a sciaenid fish from Florida. The latter two species differ significantly from the present form in that the seminal vesicle commences dorsal or only slightly posterior to the acetabulum, and the vitelline follicles extend preacetabularly. *P. umbrinae* differs further in having a lobed ovary and the forebody approximately the same length as the posttesticular space, while *P. manteri* has a transversely elongate oral sucker, an esophagus the same length as the pharynx, and smooth testes. *P. barkeri* differs in having the forebody approximately the same length as the posttesticular space, a larger sucker ratio, an esophagus shorter than the pharynx, and smooth testes. *P. scorpaenae* differs in having a larger sucker ratio, the pharynx as long as or longer than the oral sucker, the testes tandem, and the seminal vesicle entirely tubular and sinuous.

PSEUDOPECOELUS GIBBONSIAE, new species Manter & VanCleave 1951

PLATE 12, FIGURES 6, 7

Description (based on two specimens).—Body (pl. 12, fig. 6) rather thick, unspined, 2.262 to 2.558 mm. in length, 0.643 to 0.780 mm. in thickness at acetabular level. Oral sucker (os) 0.179 to 0.195 mm. in length; 0.187 to 0.195 mm. in thickness. Acetabulum (ac) slightly protuberant, without papillae; 0.421 to 0.468 mm. in length; 0.382 to 0.429 mm. in depth. Ratio of sucker lengths, 1:2.35 to 2.4. Acetabulum 0.773 to 0.811 mm. or about one-third body length from anterior end. Prepharynx 0.055 to 0.086 mm. in length. Pharynx (ph) large, 0.163 to 0.179 mm. long by 0.179 to 0.195 mm. thick. Esophagus frequently longer than pharynx, 0.269 mm. long in the 2.558 mm. specimen, in which the pharynx was 0.179 mm. long. Ceca (ic) ending blindly near posterior end of body. Genital pore (gp) ventral, slightly to the left, opposite posterior fourth of pharynx; accessory suckers lacking. Testes (t) smooth, subspherical, tandem, contiguous, in midregion of hindbody; post-



testicular space 0.523 to 0.577 mm. Seminal vesicle (sv) a relatively narrow sinuous tube extending from near the genital pore posterior to acetabulum almost to ovary; cirrus very short; cirrus sac lacking; a few gland cells (pl. 12, fig. 7) in region of genital pore. Ovary globular, smooth, immediately pretesticular, slightly to the right; seminal receptacle lacking; sperm cells in uterus; Mehlis' gland very large and conspicuous; vitelline follicles (v) large, extending from a point about midway between pharynx and acetabulum continuously to posterior end of body, surrounding the ceca. Uterus preovarian; metraterm lacking; eggs 90 to 92μ by 36 to 47μ, when uncollapsed 90 to 92μ by 43 to 47μ. Excretory vesicle extending to posterior edge of ovary.

Host.—*Gibbonsia metzi* Hubbs, weed sawfish.

Location.—Intestine.

Holotype.—U.S.N.M. Helm. Coll. No. 37145.

Discussion.—The genus *Pseudopecoelus* contains the following species: *vulgaris* (Manter, 1934) Von Wicklen, 1946; *japonicus* (Yamaguti, 1938) Von Wicklen, 1946; *elongatus* (Yamaguti, 1938) Von Wicklen, 1946; *tortugae* Von Wicklen, 1946; *priacanthi* (MacCallum, 1916) Manter, 1947. *P. gibbonsiae* differs from all these in that its vitellaria extend anterior to the acetabulum. *P. vulgaris* and *P. japonicus* have a lobed ovary. *P. elongatus* has a more posterior genital pore and smaller eggs, and its vitellaria are interrupted opposite the gonads. *P. tortugae* has a more posterior genital pore, much longer hindbody and uterus, and smaller eggs. *P. priacanthi* has a different sucker ratio and much smaller eggs.

PSEUDOPECOELUS UMBRINAE Manter & Van Cleave, 1951

Twenty-one specimens were recovered from *Umbrina roncador* Jordan & Gilbert, the same hosts reported by Manter & Van Cleave (*l.c.*) from this area. Seven specimens were collected from *Roncador stearnsi* (Steindachner).

Hosts: *Umbrina roncador* (Jordan & Gilbert). Yellowfin croaker (Sciaenidae). *Roncador stearnsi* (Steindachner). Spotfin croaker (Sciaenidae); new host record.

Location: Intestine.

Pseudopecoelus **gymnothoracis** n.sp.
Nahhas & Cable, 1964
Figure 28

Host: Gymnothorax moringa (C).
Site: intestine.
Holotype: U.S.N.M. 60275.

Description based on 8 specimens. Body pyriform to linguiform, 1.40-1.85 long, 0.637-0.830 wide. Cuticle smooth. Oral sucker 0.113-0.133 long, 0.120-0.153 wide. Ventral sucker 0.200-0.233 long, 0.233-0.273 wide; sucker ratio 1:1.7-2.1. Prepharynx short; pharynx 0.038-0.060 in diameter; esophagus 3-5 times length of pharynx; intestinal bifurcation about midway between suckers; ceca converge posteriorly, ending blindly at about midlevel of posttesticular space. Testes 2, extremely lobed, constricted medially, 0.113-0.266 long, 0.333-0.440 wide. Cirrus sac absent; seminal vesicle tubular, extending well posterior to acetabulum but not reaching ovary; pars prostatica weakly developed, prostate cells few; ejaculatory duct short. Ovary lobed, pretesticular, submedian, 0.100-0.120 long, 0.173-0.200 wide; uterine seminal receptacle, Mehlis' gland and uterus preovarian; Laurer's canal present; metraterm well-developed. Genital atrium small, genital pore sinistral, at about midesophageal level. Eggs 54-69 by 30-45 μ, usually 63-67 by 37-42. Vitelline follicles numerous, extending along entire length of ceca, confluent at intestinal bifurcation. Excretory vesicle tubular, extending to ovarian level.

The combination of highly lobed and medially constricted testes with vitelline follicles broadly confluent at the intestinal bifurcation distinguishes this species from all others in the genus *Pseudopecoelus*.

Manter, 1954

23. **Pseudopecoelus hemilobatus** n.sp.

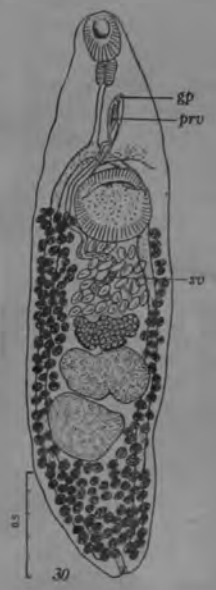
(Figs. 30-31)

HOST: *Cyttus australis* (Richardson), boar fish; intestine.

LOCALITY: Portobello.

HOLOTYPE: U.S. Nat. Mus. Helminth. Collection No. 49129.

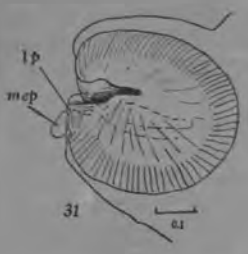
DESCRIPTION (based on two specimens and fragments of two others): Body unspined, elongate, forebody tapering, posterior end broadly rounded and only slightly tapered. Length 2·570 to 2·940 mm., greatest width near midbody 0·658 to 0·795 mm. Oral sucker 0·169 to 0·231 mm. wide, somewhat longer than wide when extended; acetabulum 0·369 to 0·455 mm. wide, slightly wider than long. Sucker ratio 1 : 2 to 2·2. Acetabulum only slightly protuberant, with narrow transverse aperture; upper lip without papillae; posterior lip with one pair of short muscular papillae and a single, median, bilobed, non-muscular papilla (Fig. 31). Forebody 0·672 to 0·728 mm., varying with contraction from about $\frac{1}{3}$ to slightly more than $\frac{1}{4}$ total body length. Prepharynx lacking; pharynx 0·133 to 0·161 mm. long by 0·102 to 0·107 mm. wide; oesophagus 0·246 to 0·285 mm. or from $1\frac{1}{2}$ to 2× length of pharynx; bifurcation just anterior to acetabulum; caeca extending to near posterior end of body where each ends blindly.



Genital pore a little to left of midline, opposite posterior half of pharynx or a little posterior to pharynx. Testes large, tandem or slightly diagonal, in posterior half of hindbody, wider than long, filling intercaecal space, close together, usually slightly bilobed; posttesticular space 0·504 to 0·560 mm. Cirrus very short; cirrus sac lacking; prostatic vesicle elongate, about 0·152 by 0·018 mm.; seminal vesicle tubular, becoming sinuous posterior to acetabulum, extending more than halfway between acetabulum and ovary (0·121 to 0·152 mm. from ovary).

Ovary rather deeply trilobed with some secondary lobing. Seminal receptacle lacking. Mehlis' gland dorsal to first part of uterus just anterior to ovary; uterus preovarian; metraterm weakly muscular about $\frac{3}{4}$ length of prostatic vesicle. Vitelline follicles fairly large, beginning opposite middle of acetabulum on the right, at posterior edge of acetabulum on the left, extending unbroken to near posterior end of body, dorsal and ventral to caeca, not meeting between gonads. Eggs 68 to 71 by 39 to 44μ. Excretory pore terminal; extent of vesicle not observed.

Numerous gland cells occur in the forebody near the ventral surface just anterior to the acetabulum. These are not vitellaria-like. A transverse groove in the ventral surface just anterior to the acetabulum might be more than a fold but its aperture does not have a definite boundary nor musculature. An accessory sucker is absent.



The name *hemilobatus* is from *hemi*, half, and *lobatus*, lobed and refers to the papillae being limited to the posterior half of the acetabulum.

DISCUSSION: This species is placed in the genus *Pseudopecoelus* because the caeca end blindly, and an accessory sucker is lacking. However, *Pseudopecoelus* supposedly lacks acetabular papillae whereas they occur in *P. hemilobatus* but only on the posterior lip of the acetabulum. In this respect, *P. hemilobatus* differs from all the other seven species in the genus. Otherwise it appears to be most like *P. japonicus* (Yamaguti, 1938) Von Wicklen, 1946 from mostly deepwater fishes of Japan, differing chiefly in the sucker ratio.

The specimen identified as *P. japonicus* from *Centriscops humerosus* from Portobello is very similar to *P. hemilobatus*. However, it showed no papillae or lobes on the acetabulum although a central posterior portion was everted. Other differences are shorter prostatic vesicle, shorter oesophagus, more lobed testes, more anterior extent of the vitellaria, wider and larger oral sucker. It must be admitted that some of these differences are not great and may be partly due to contraction; but in view of the apparent absence of acetabular papillae, the two species are considered different at least for the present.

Opecoelidae

Pseudopecoelus **holocentri** n.sp.
Nahhas & Cable, 1964

Synonym: ***Pseudopecoelus elongatus* of Hanson, 1950, nec (Yamaguti, 1938)

Host: *Holocentrus ascensionis* (C).

Site: intestine.

Holotype: U.S.N.M. 60274.

Description based on 2 specimens. Body slender, 2.45-3.28 long, 0.600-0.667 wide. Oral sucker 0.120-0.130 long, 0.128-0.135 wide; ventral sucker in anterior fourth of body, 0.240-0.280 in diameter, without papillae; sucker ratio 1:2-2.15. Prepharynx short; pharynx 0.105 long, 0.090-0.114 wide; esophagus 0.098-0.112 long; ceca end blindly near posterior end of body. Testes 2, tandem, lobed, not contiguous, 0.293-0.346 long, 0.213-0.273 wide; seminal vesicle tubular, extending about 1/3 distance from ventral sucker to ovary; ejaculatory duct short; pars prostatica indistinct. Ovary pretesticular, slightly irregular, 0.133-0.166 in diameter; uterine seminal receptacle, Mehlis' gland and uterus preovarian; metraterm well-developed. Genital pore sinistral, near anterior margin of pharynx. Eggs 52-54 by 27-30 μ. Vitelline follicles extending from near posterior level of ventral sucker to the posterior end of body, interrupted opposite gonads. Excretory vesicle extending to ovarian level; pore terminal.

The only other species of *Pseudopecoelus* with vitellaria interrupted opposite the gonads is *P. elongatus* (Yamaguti, 1938). That species differs from *P. holocentri* in having a smaller pharynx, a different sucker ratio (1:1.56 compared with 1:2-2.15) and a longer posttesticular space.

Some of the specimens which Hanson (1950) reported as *P. elongatus* have been examined and found to agree with the present species except in having somewhat less irregular gonads.

Synonym: the P. elongatus (Yam., 1938) of Hanson, 1950

Allocreadiidae

Pseudopecoelus ~~Cymbephallus~~ japonicus (Yamaguti, 1938) Von Wicklen, 1946

Length: 1.9-3.75 mm.

Width: 0.6-1.0 mm at level of acetabulum or behind it.

Oral sucker: Subterminal, 0.15-0.25 X 0.17-0.26 mm.

Acetabulum: (size:) 0.24-0.38 mm in diameter.
(position): At posterior half of anterior third of body

Sucker ratio:

Esophagus: Slender, bifurcating a little in front of acetabulum.
Pharynx: Barrel-shaped, 96-154 X 75-114 μ.

Genital pore (location): Somewhat to the left or median, at level of pharynx.

Testes, shape: Irregularly dented, 0.2-0.5 X 0.25-0.45 mm.
location: Postequatorial, one immediately or short distance behind other, post. med. or slt. dextral, ant. med. or slt. sinistral.

Cirrus sac (extent):

Ovary, shape: 3-lobed, 0.15-0.25 X 0.24-0.38 mm.
location: Immediately in front of anterior t
or slightly to the right.

Vitellaria: Follicles relatively large, extending f
acetabulum to posterior end.

Eggs: Ellipsoidal, light brown, 63-84 X 36-54 μ.

~~Other features:~~ Sayonara satsumae Jordan et Seale,

Host: Gunther, Zenopis nebulosus (Temm. et Schleg.)
Ateleopus japonicus Bleeker, Sirembo imberbis
Synagrops japonica (Doderlain), Chlorophthalm
Jordan et Starks, Pseudorhombus pentophthalmu

Locality: Off Maisaka and Suruga Bay, Siduoka Prefe

Reference: Studies on the Helminth Fauna of Japan
Trematodes of Fishes, IV. Kyoto,

Comparisons: C. vulgaris Manter, 1934

Hosts: (cont.) Aulopus japonicus Gunther, Chelidop
(Cuv. et Valenc.), Trachurus trachu

Life cycle:

from deepwater fishes

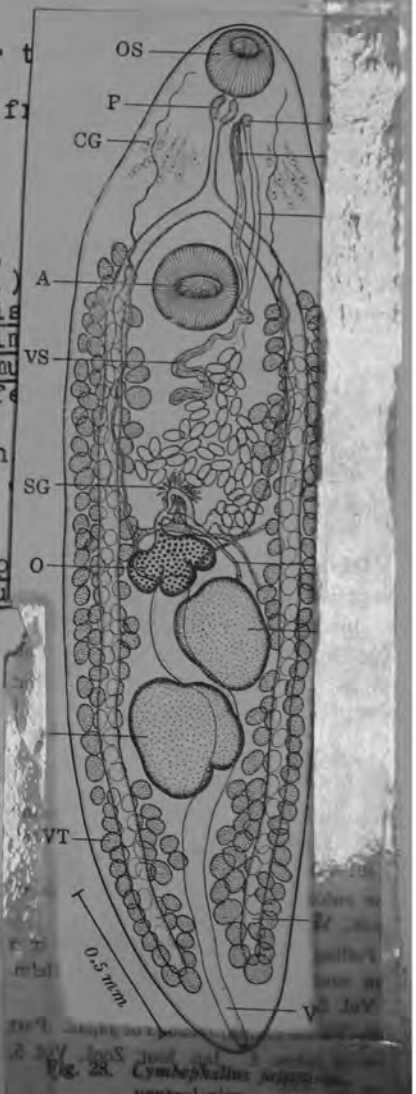


Fig. 28. Cymbephallus japonicus, ventral view.

24. **Pseudopecoelus japonicus** (Yamaguti, 1938) Von Wicklen, 1946
(Figs. 32-33)

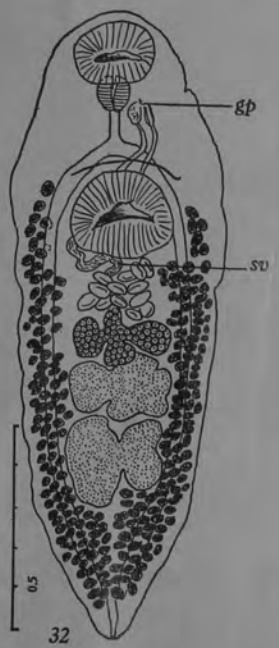
HOST: *Centriscops humerosus* (Richardson), bellows fish; intestine.

LOCALITY: Portobello.

SPECIMEN DEPOSITED: U.S. Nat. Mus. Helminth. Collection No. 49162.

DISCUSSION: A single specimen of this trematode was collected. It resembles *P. vulgaris* except in egg size, the chief difference which Yamaguti used to distinguish his *P. japonicus* collected from eleven species of deepwater fishes in Japan. My specimen differs from Yamaguti's description in that the testes are deeply lobed rather than " indented "; both suckers are relatively larger; and the uterus is shorter. Since these are characters probably varying with age and contraction, and only one specimen was available, it is considered to be *P. japonicus* with which it agrees in such characters as sucker ratio, position of genital pore, extent of vitellaria, egg size, and shape of ovary. It resembles *P. vulgaris* particularly in shape of the gonads but the egg size is much smaller and the sucker ratio different.

Measurements were: size 1·540 by 0·539 mm., but somewhat contracted; forebody 0·277 mm., oral sucker 0·192 mm. wide; acetabulum 0·254 mm. wide; sucker ratio 1 : 1·32; pharynx 0·099 by 0·099 mm.; oesophagus 0·095 mm. long; caeca ending blindly near posterior end of body; eggs 70 to 72 by 34 to 38μ.



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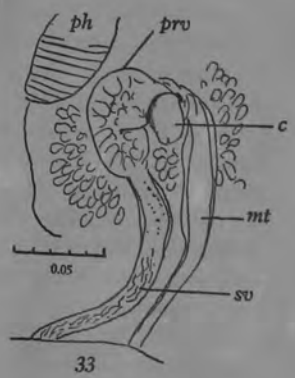

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Description of the Progenetic Metacercaria of *Pseudopecoelus japonicus* (Allocreadiidae : Trematoda) from *Euphausia similis* (Euphausiacea : Crustacea) of Suruga Bay

The cysts lay in the cardiac region under the carapace of the krills. They were subglobular, measured 0.71 to 1.81 mm long by 0.54 to 1.61 mm wide (based on six cysts). The cyst walls consisted of two layers, and measured 0.03 to 0.06 mm thick. The metacercariae in double-position in cysts were fully gravid, and laid eggs in cysts, except few immature worms.

Description of metacercaria (Fig. 1, measurements based on ten metacercariae) : Body oval, small, 0.89 to 2.50 mm long by 0.74 to 1.26 mm in maximum width. Cuticle smooth. Oral sucker subterminal, 0.17 to 0.33 mm in transverse diameter. Pharynx muscular, 0.10 mm in transverse diameter. Esophagus short, bifurcating a little in front of ventral sucker. Ceca simple, terminating blindly near posterior end of body. Ventral sucker preequatorial, slightly protrusible, larger than oral sucker, 0.27 to 0.34 mm in transverse diameter. Accessory sucker and papillae on ventral sucker absent. Testes two, irregularly indented, almost tandem, postequatorial, anterior : 0.27 to 0.45 mm by 0.13 to 0.31 mm, posterior : 0.30 to 0.46 mm by 0.15 to 0.40 mm. Seminal vesicle external, tubular, sinous, long, winding, extending posteriorly to ventral sucker. Prostate gland cells not observed. True cirrus pouch probably absent, but cirrus short in sheathlike structure. Genital pore slightly to left of pharynx. Ovary lobed, median, immediately pretesticular, 0.03 to 0.57 mm by 0.11 to 0.15 mm. Ootype immediately in front of ovary. Lauer's canal not observed. Seminal receptacle absent. Uterus intercecal, coiled between ventral sucker and ovary, with few eggs in it. Eggs operculate, sometimes with a small knoblike process at anoperculate pole, and with a thin hyaline membrane around shell, 67 to 81 μ by 37 to 42 μ (based on ten eggs), and embryo not developing to miracidium. Vitelline follicles extending from level of intestinal bifurcation to posterior end of body. Excreatory vesicle tubular, dorsal to testes, reaching ovary.

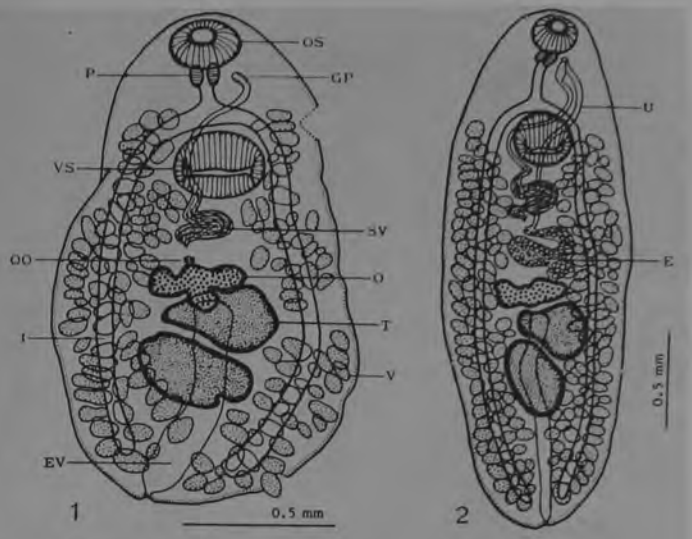


Fig. 1. Metacercaria of *Pseudopecoelus japonicus* liberated from cyst from *Euphausia similis*. Ventral view. Eggs have not been formed in this specimen. Uterus is omitted.

Fig. 2. Metacercaria of *P. japonicus* from *E. similis* ingested in the stomach of *Chlorophthalmus albatrossis* of Tosa Bay. Ventral view. E : eggs, EV : excreatory vesicle, GP : genital pore, I : intestine, O : ovary, OO : ootype, OS : oral sucker, P : pharynx, SV : seminal vesicle, T : testis, U : uterus, V : vitellaria, VS : ventral sucker.

Discussion

These metacercariae belong to the genus *Pseudopecoelus* von Wicklen, 1946 (Allocreadiidae : Trematoda), because they have the smooth cuticle, the ventral sucker with no papillae, no accessory sucker, the ceca ending blindly, no ture cirrus pouch, and the external tubular seminal vesicle. The characteristics of this metacercaria agree to the description of the adult of *P. japonicus* by Yamaguti (1938), in having the lobed ovary, the genital pore being to left of pharynx, the ventral sucker slightly larger than the oral sucker (sucker ratio 1 : 1.00 to 1.51), the egg size, and the same locality, though the vitellaria extending slightly anteriorly to the ventral sucker. Consequently, the metacercaria from *E. similis* is identified with that of *Pseudopecoelus japonicus* (Yamaguti, 1938) von Wicklen, 1946.

Yamaguti (1938) recorded the cyst of *P. japonicus* from the peribuccal connective tissue of a jack mackerel, *Trachurus trachurus*,

of Suruga Bay, where he obtained also the adult trematode, and he described it very briefly. Yamaguti's cyst was subglobular, measured 1.3 mm by 1.2 mm, and it contained a fully gravid worm. The present cysts from the krills are slightly larger than his cyst, and they contain also a fully gravid worm, namely the 'progenetic' metacercaria.

Accordingly, in the life cycle of *P. japonicus*, both the crustacea and the fish serve as the second intermediate host. It is not common that the fish serves as the second intermediate host among the closely related species to *P. japonicus*, as far as their life cycles or their second intermediate hosts are now known. No first intermediate hosts of *Pseudopecoelus* are found out.

Dr. Yuzo Komaki, Tokyo Univerity, recongnized that a krill, *Euphausia similis* G. O. Sars (Euphausiacea : Crustacea), was infected with a slightly ellipsoidal alien body under its carapace, while working on the biomass of micronectonic crustacea of Suruga Bay in 1969. He sent the krills with the alien body to Prof. Tomoo Oshima and me for the parasitological observations.

I observed the alien body to be the progenetic metacercaria of *Pseudopecoelus japonicus* (Yamaguti, 1938) von Wicklen, 1946 (Allocreadiidae : Trematoda). Dr. Komaki previously reported the alien body as the metacercaria of *P. japanicus* or of its closely related species, under my opinion [Komaki, Y. (1970) : J. Oceanogr. Soc. Japan, 26 (5), 283–295].

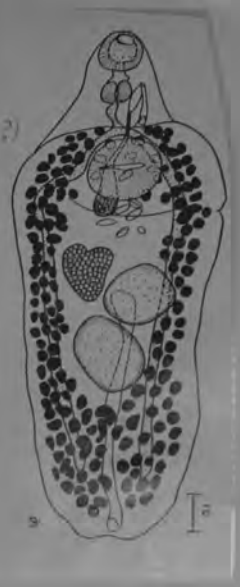
This paper deals with the morphology and the specific identification of the metacercaria. For the purpose of the ecological studies of this parasite, see also Komaki (1970).

From SHIMAZU, 1971

5. *Pseudopecoelus manteri* n. sp. Sogandares & Hutton, 1959
(Fig. 9)

Host: *Bairdiella chrysurus* (Lacepede); silver-perch; family Sciaenidae
Incidence of Infection: In 4 of 9 hosts
Number: 1, 1, 1, 1

Location: Pyloric ceca
Locality: Tarpon Key, Boca Ciega Bay, Florida
Holotype: U. S. Nat. Mus. Helm. Coll. No. 39002



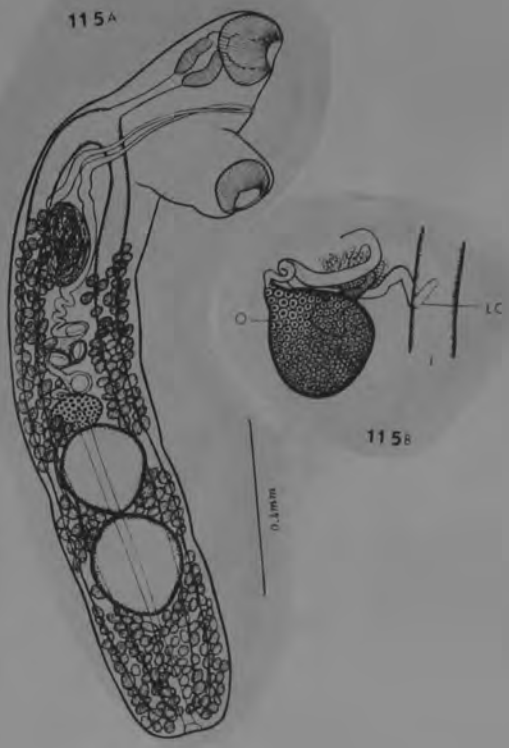
Diagnosis (Based on 4 specimens): *Pseudopecoelus;* body elongate, plump, broadly rounded posteriorly, conical anterior to acetabulum, 0.94 to 1.44 long by 0.42 to 0.56 wide. Cuticle unspined. Oral sucker terminal, 0.06 to 0.08 long by 0.10 to 0.12 wide. Acetabulum in anterior ⅓ body, short pedunculate, unornamented, 0.18 to 0.20 long by 0.16 to 0.22 wide. Sucker ratio 1:0.9 to 1.1. Prepharynx from ¼ length to approximately same length as pharynx. Pharynx 0.05 to 0.07 long by 0.06 to 0.07 wide. Esophagus approximately same length of pharynx. Cecal bifurcation immediately preacetabular; ceca ending blindly ⅔ distance between posterior testis and posterior end of body. Genital pore sinistral and level with anterior border of pharynx. Testes 2, intercecal, roundish, oblique, almost in contact with each other, anterior testis equatorial, sinistral to midline of body, 0.14 to 0.18 long by 0.16 to 0.18 wide; posterior testis dextral or median, 0.14 to 0.22 long by 0.12 to 0.20 wide. Seminal vesicle from slightly posterior to acetabulum to enter a prostatic vesicle which is approximately same length of pharynx and connects with a very short cirrus which opens through genital pore. Ovary either with a single anterior notch or smooth, roundish to subtriangular in shape, to the right and level with anterior testis; 0.06 to 0.14 long by 0.10 to 0.12 wide. Seminal receptacle absent. Vitellaria medianly coalescing anterior and dorsal to acetabulum, extending posteriorly on each side of the body, overlapping ceca dorsally and ventrally to fill posttesticular space dorsally and ventrally. Uterus preovarian, extending from ovary to genital pore. Eggs collapsed, 48 to 60 microns long by 28 to 36 microns wide. Excretory pore terminal or subterminal, depending upon contraction of posterior end of body. Excretory vesicle tubular, extending from excretory pore to posterior level of ovary.

The name *manteri* is in honor of Professor Harold Winfred Manter, Department of Zoology, University of Nebraska, in recognition of his extensive contributions to the field of helminthology.

Discussion: This species is identified as *P. umbrinae* Manter & Van Cleave, 1951 and *P. gibbonsiae* Manter & Van Cleave, 1951 in Manter's (1954b: p. 6) key. Both species are from the coast of California. *Pseudopecoelus manteri* differs from *P. umbrinae* by possessing smaller testes, an ovary which is never 3 to 4 lobed, and longer prostatic vesicle. *Pseudopecoelus manteri* differs from *P. gibbonsiae* by possessing a seminal vesicle which extends only slightly posterior to acetabulum, oblique testes, and genital pore at anterior border of pharynx, as compared with seminal vesicle extending far beyond acetabulum, almost to ovary, tandem testes and genital pore at mid-pharyngeal level. *Pseudopecoelus manteri* differs from all other species of *Pseudopecoelus* by possessing vitellaria which extend anterior to acetabulum as compared with vitellaria posterior to acetabulum.

Pseudopecoelus manteri in this collection was found associated with *Bucephaloides caecorum* Hopkins, 1956 and *Tergestia pectinata* (Linton, 1905) Manter, 1940.

101. *Pseudopecoelus maomao* ~~n. sp.~~ Yamaguti, 1970
(Fig. 115)



HABITAT: Intestine of *Abudefduf abdominalis* (local name "maomao"); Hawaii.

HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63722.

DESCRIPTION (based on ten whole mounts): Body elongate, nearly subcylindrical, though tapering anteriorly in forebody, 1.35-2.2 mm long, 0.25-0.34 mm wide in ovariotesticular region. Cuticle smooth. Oral sucker ventroterminal, 0.1-0.14 × 0.12-0.16 mm; prepharynx distinct; pharynx barrel-shaped, 90-110 × 50-120 μ, may be constricted near anterior end; esophagus 0.11-0.12 mm long, bifurcating at base of acetabular peduncle; ceca terminating blindly at posterior extremity. Acetabulum smaller than oral sucker, 0.08-0.13 × 0.11-0.13 mm, provided at anterior and posterior ends with strong muscle bundles extending toward the base of the peduncle which is 0.2-0.25 mm long, Sucker ratio 1.1-1.5:1.

Testes rounded to oval, 0.15-0.29 × 0.12-0.2 mm, directly tandem, nearer to posterior extremity than to base of acetabular peduncle. Seminal vesicle saccular, occasionally somewhat curved to one side, 0.14-0.23 × 0.07-0.11 mm, reaching to anterior end of middle third of body or more posteriorly. Pars prostatica not differentiated. Genital pore at level of pharynx.

Ovary subglobular, 60-110 × 80-110 μ, situated in postequatorial midregion of body immediately in front of anterior testis. Germiduct arising from anterodextral end of ovary, giving off Laurer's canal near its origin. Laurer's canal running transversely anterodorsal to ovary and opening dorsal to left cecum at level of anterior end of ovary. No seminal receptacle. Uterus winding forward from in front of ovary, passing beside seminal vesicle; metraterm running alongside male duct. Eggs oval, 44-56 × 28-35 μ in life. Vitellaria circumcecal, commencing at level of seminal vesicle, usually interrupted opposite testes, confluent in posttesticular area; vitelline reservoir anterodorsal to ovary. Excretory vesicle tubular, reaching to ovary, with terminal pore.

DISCUSSION: This species differs from the most closely related *Pseudopecoelus elongatus* (Yamaguti, 1938) from Japanese *Scombrops boops* in the seminal vesicle being saccular and distinctly set off and in the eggs being a little smaller. In *P. elongatus* there is a cylindrical pars prostatica enclosed in a muscular sheath, the seminal vesicle is tubular and sinuous, and the eggs are 54-60 μ by 33-36 μ. The specific name refers to the local name of the host.

Pseudopecoelus **minutus** n.sp.
Nahhas & Cable, 1964
(Figure 29)

Host: *Doratonotus megalepis* (C).
Site: intestine.
Holotype: U.S.N.M. 60276.

Description based on 6 specimens, measurements on 4 mature ones. Body elongated, rounded at both ends, 0.606-0.720 long, 0.180-0.233 wide. Oral sucker 0.063-0.075 in diameter; ventral sucker at junction of anterior and middle third of body, 0.105-0.135 in diameter; sucker ratio 1:1.7-2.0.

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Prepharynx absent; pharynx 0.030-0.040 long, 0.042-0.048 wide; esophagus 1-2 times length of pharynx; ceca end blindly a short distance from posterior end of body. Testes 2, tandem, entire, contiguous, 0.045-0.120 in diameter; seminal vesicle long, reaching about midway between ventral sucker and ovary; pars prostatica not evident. Ovary pretesticular, subtriangular, smooth, 0.030-0.075 in diameter; Mehlis' gland, uterine seminal receptacle and uterus preovarian; metraterm well-developed. Genital atrium muscular; genital pore sinistral, near posterior margin of pharynx. Eggs few, 45-54 by 22-30 μ. Vitelline follicles extending anterior to ventral sucker, usually interrupted lateral to acetabulum. Excretory vesicle tubular, extending to level of ovary; excretory formula $2[(2+2) + (2+2)] = 16$ flame cells.

Only *Pseudopecoelus gibbonsiae* Manter and Van Cleave, 1951, shares with this species the combined features of an entire ovary and vitellaria that extend anterior to the acetabulum. However, *P. gibbonsiae* is much larger (2.26-2.55 by 0.643-0.780) and its eggs almost twice the size of those of *P. minutus*.

The pygmy wrasse which harbors this species lives in clumps of rockweed in close association with the snail, *Columbella mercatoria*, and an amphipod which probably serve as intermediate hosts. A minute opecoelid cercaria, to be described elsewhere, develops in that snail and was observed to penetrate and encyst in the amphipod.

Opecoelidae

Pseudopecoelus nossamani ~~sp. n.~~

(Figs. 3 and 4)

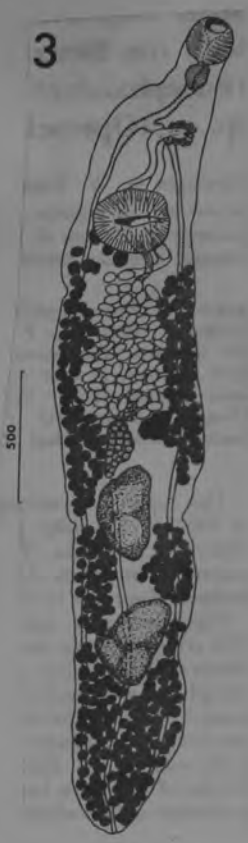
HOST: *Hippoglossus stenolepis* Schmidt, Pleuronectidae, Pacific halibut; 2 specimens from 1 host.

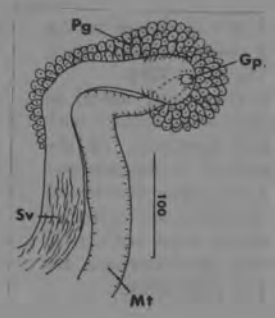
TYPE SPECIMENS DEPOSITED: USNM Helminth. Coll. No. 74121 (holotype), 74122.

DESCRIPTION: Body elongate, 2531–3191 long by 465–539 wide at ovarian level. Tegument unspined. Forebody conical, ¼ body length. Oral sucker subterminal, 140–160 long by 92–160 wide. Acetabulum slightly protrusible, nonpapillate, 204–224 long by 244–276 wide. Sucker ratio 1:1.72. Prepharynx short; pharynx 92–120 long by 76–96 wide; esophagus 156–228 long; intestinal bifurcation midway between suckers; ceca ending blindly near posterior end of body. Genital pore ventral, slightly to left of cecal bifurcation. Testes tandem, intercecal, 236–332 long by 176–232 wide; posttesticular space 375–510. Seminal vesicle narrow, sinuous extending from near genital pore posteriorly to region near ovary; cirrus short; cirrus sac absent; prostatic gland cells in region of genital pore. Ovary trilobed, pretesticular, median, 80–112 by 172–180 wide; seminal receptacle lacking; Mehlis' gland preovarian; vitelline follicles circumcecal extending from level of acetabulum to posterior end of body, interrupted lateral to testes, filling posttesticular space. Uterus preovarian, extending to acetabulum; metraterm weakly muscular; uncollapsed uterine eggs 80 to 84 long by 44 wide. Excretory vesicle tubular, extending to ovary.

DISCUSSION: The eggs in these specimens are larger than those of all other known species of *Pseudopecoelus* except for *P. japonicus* (Yamaguti, 1938) Von Wicklen, 1946 (63–84 long by 36–54 wide) and *P. vulgaris* (Manter, 1934) Von Wicklen, 1946 (young worms: 78–80 long by 40 wide; older worms: 90–127 long by 50–76 wide). The sucker ratio of *Pseudopecoelus japonicus* is smaller (1:1.2–1.3) and that of *P. vulgaris* is larger (1:2–3). The species is named in honor of Bob J. Nossaman, York College, professor of biology.

A second species of *Pseudopecoelus* was represented by a single specimen from *Myxocephalus polyacanthocephalus* (Pallas), Cottidae, but it was macerated and cannot be described.





Manter, 1947

52. **Pseudopecoelus priacanthi** (MacCallum, 1921) ~~n. comb.~~

Fig. 40

73.

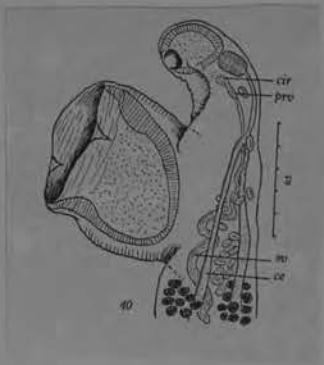
SYNONYM: *Allocreadium priacanthi MacCallum*, 1921 (Fig. 39).

HOSTS: *Priacanthus arenatus* Cuv. & Val., glass-eye snapper or big-eye; one specimen in 1 of 3 hosts. *P. cruentatus* (Lacépède),* big-eye; one specimen in 1 of 3 hosts.

LOCATION: Intestine.

Discussion: MacCallum (1921) described this species as *"Allocreadium priacanthi"* from *Priacanthus arenatus* from Key West, Florida. It cannot belong in the genus *Allocreadium* because of its lack of a cirrus sac. The projecting acetabulum is a conspicuous feature. The deep, cup-shaped acetabulum bears no papillae but it is lobed by a lateral notch on each side covered by a continuous surface membrane (Fig. 40). This character was not clearly indicated by MacCallum who did imply the membraneous border in describing the acetabulum as "a beautiful filmy structure." The genital pore in both of my specimens is to the left opposite midpharynx, slightly anterior to the point described by MacCallum. The genital atrium is muscular and continues into a bulbous cirrus about the same length as the narrower prostatic vesicle surrounded by a few prostatic cells (Fig. 40). The sinuous seminal vesicle extends barely past the anterior limit of the vitellaria which end at the base of the acetabular stalk. The terminal male organs are similar to those of *P. vulgaris* (Manter, 1934) von Wicklen, 1946 and other species in the genus. The ceca end blindly.

This species is unique in the shape of the acetabulum. It differs from *P. tortugae* von Wicklen, 1946 in that the gonads are separated; the genital pore is more anterior and the eggs (about 53 by 17 μ) are smaller.



unlobed testes
& ovary

100. *Pseudopecoelus pubipaka* ~~n. sp.~~ Yam., 1970
(Fig. 114)

HABITAT: Intestine of *Gymnothorax flavimarginatus* (local name "puhipaka"); Hawaii.

HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63721.

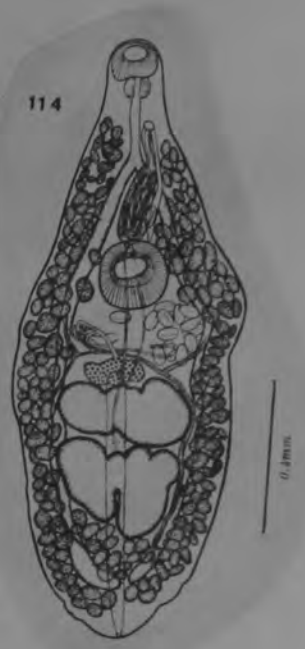
DESCRIPTION (based on a single whole mount): Body flattened pyriform, 1.56 mm long, 0.56 mm wide at level of anterior testis. Oral sucker terminal, 0.1 X 0.12 mm, with subterminal aperture; prepharynx very short; pharynx 40 X 70 μ; esophagus 0.15 mm long; cecal ends distinctly separate, though close to each other. Acetabulum 0.18 X 0.17 mm, at anterior part of middle third of body.

Testes large, irregularly lobed, directly tandem, about junction of middle with posterior third of body; anterior 0.18 X 0.34 mm, posterior 0.23 X 0.31 mm. Seminal vesicle subcylindrical, 0.2 X 0.07 mm, extending a little obliquely between acetabulum and intestinal bifurcation.

Cirrus pouch cylindrical, membranous, 80 μ long, containing slender ejaculatory duct; pars prostatica not distinctly differentiated. Genital pore to left of esophagus, 0.22 mm from head end.

Ovary transversely elongated, 0.07 X 0.16 mm, with two shallow incisions on anterior and posterior margins. Germiduct running anterodextrad, giving off Laurer's canal a little away from its origin and turning back on itself to unite with common vitelline duct just dextral to origin of Laurer's canal. Laurer's canal running transversely anterior to ovary, turning forward and then inward before opening dorsally about 0.11 mm in front of left anterior end of anterior testis. No seminal receptacle. Uterus winding in intercecal field between left end of anterior testis and acetabulum; metraterm running alongside male terminalia. Eggs oval, 56-59 X 32-35 μ in life. Vitelline follicles comparatively large, extending along intestine, mostly on its outer side, confluent between posterior testis and posterior cecal ends; commencing in esophagual zone at different levels; vitelline reservoir slightly anterior to right end of ovary. Excretory vesicle tubular, reaching to ovary; pore terminal.

DISCUSSION: This species is characterized by the seminal vesicle being subcylindrical and much wider than in any other species and not extending back of the acetabulum. In this respect it bears a certain resemblance to *Pseudopecoelus umbrinae* Manter et Van Cleave, 1951 from *Umbrina roncador* of California, but differs from the latter in the relative position of the ovary and testes and in the submedian genital pore being at midesophageal level instead of midpharyngeal.



PSEUDOPECOELUS PYRIFORMIS ~~sp. nov.~~ Prudhoe and Bray, 1973

(Fig. 10)

Host and locality: *Callanthias allporti* — Stn. 113.

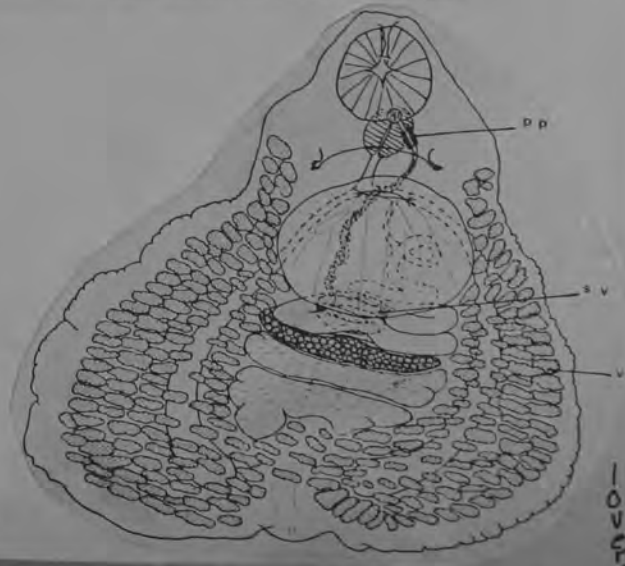
Seven specimens in a contracted condition are available. The shape of the body varies from roughly triangular to broadly pyriform. In forms with a triangular outline the posterior margin of the body is more or less straight, while in all specimens the anterior region tapers somewhat. In length the body varies between 1.22 mm and 1.54 mm and the maximum width between 0.74 mm and 1.25 mm. The cuticle is without spines; much of the hind-body has transverse striations set closely together, but the presence of these striations is probably due to contraction of the body. The rounded, rather muscular, subterminal oral sucker is 0.2–0.21 mm in diameter. The ventral sucker is withdrawn well into the body, so that it actually opens into a slit-like depression on the ventral surface situated just anteriorly to the middle of the body. The sucker is, however, well developed, a little wider than long, the transverse diameter varying between 0.35 mm and 0.45 mm. The oral: ventral sucker-ratio is 1:1.7 to 2.2. Anteriorly to the ventral sucker there is a second transverse slit-like depression on the surface of the body.

The oral sucker passes into a short prepharynx, which has been observed only in serial sections, and thence into an elongate pharynx measuring 0.12–0.16 mm × 0.08–0.12 mm. The oesophagus measures up to 0.065 mm in length and is lined with cuticle. It bifurcates a little anteriorly to the ventral sucker, and the intestinal caeca extend to near the posterior end of the body, where they end blindly. The caeca are lined with an epithelium staining deeply with Ehrlich's haematoxylin.

A narrow canal runs from the terminal excretory pore for a short distance before dilating to form a claviform excretory vesicle extending forward to a position dorsally to the ovary.

The genital pore is somewhat muscular and is situated at about the level of the pharynx, to the left of the median line. It often appears to be placed on a distinct protuberance of the body. The testes are disposed one directly behind the other. They are transversely elongate—no doubt due to the contraction of the body—and irregularly lobed. The anterior testis measures 0.38–0.47 mm × 0.09–0.16 mm and the posterior testis 0.37–0.43 mm × 0.11–0.17 mm. Their vasa efferentia open directly into a narrow much-convoluted seminal vesicle lying dorsally and posteriorly to the ventral sucker. In front of the sucker, the vesicle opens into a well-developed pars prostatica. From the latter, the wide ejaculatory duct extends a short distance, and then unites with the metraterm to form a short hermaphroditic duct opening through a papilla into a relatively deep genital atrium. There appears to be no cirrus-sac.

The ovary is also transversely elongate, with slightly indented margins, and measures 0.27–0.44 mm × 0.045–0.075 mm. It lies in the median line on the anterior margin of the foremost testis. Laurer's canal has been observed, but was not traced to an external opening. No receptaculum seminis has been made out, but masses of sperm lie in the proximal region of the uterus. The numerous vitelline follicles are relatively large, and laterally to the intestinal caeca they extend from a level between the pharynx and the ventral sucker to the hinder end of the body. Dorsally, the course of the follicles runs round the ends of the intestinal caeca and forwards along their inner margins to the ventral sucker, sometimes being confluent in the median line behind the testes. Moreover, they show a tendency not to overlie the caeca completely. In the ventral parenchyma, the follicles cover the caeca and are contiguous in the median line posteriorly, but not anteriorly. The uterus consists of a few transverse coils situated between the ovary and the ventral sucker. The eggs are mostly collapsed, but the few undistorted ones measure 56–62μm × 32–38μm.



10 VCT

Superficially, the somewhat triangular outline of the body of the above-described form suggests an affinity with the genus *Parvacreadium* Manter, but the specimens lack the oddly lobed ventral sucker typical of this genus. On the other hand, the morphology of the specimens appears to resemble that found in the genus *Pseudopecoelus*. In many species of this latter genus a cirrus-sac is absent, whilst in others it is said to be very weakly developed. Of the species of *Pseudopecoelus* without a cirrus-sac of any kind and having vitelline follicles extending anteriorly beyond the ventral sucker, the present form resembles *P. gibbonsiae* Manter and Van Cleave, 1951, *P. gymnothoracis* Nahhas and Cable, 1964, *P. manteri* Sogandares-Bernal and Hutton, 1959, *P. minutus* Nahhas and Cable, 1964, *P. umbrinae* Manter and Van Cleave, 1951, and *P. vitellozonatus* Pritchard, 1966. Of these species, *P. gymnothoracis*, *P. manteri* and *P. vitellozonatus* resemble the present form in size of the eggs, but differ in the confluence of the vitellaria in the median line anteriorly to the ventral sucker. On the basis of these differences the form described above is regarded as a new species.

Prudhoe and Bray, 1

OPECOELIDAE (~~sp. indet.~~) Rudhoe and Bray, 1973

Host and locality: *Chionodraco kathleenae* — A.A.E., 65°6′S, 96°14′E.

The one contracted specimen available measures 2.3 mm in length and 0.98 mm in maximum width at the level of the ovary. The forebody is narrower than the hindbody. Deep transverse folds run around the body and are presumably caused by the contraction of the worm. No spines have been observed on the body. The subterminal oral sucker is 0.26 mm in diameter, and leads into a large pharynx (0.19 mm long × 0.14 mm wide). There is a short oesophagus, which appears to be about 0.065 mm in length, and bifurcates to form the intestinal caeca which appear to terminate near the posterior margin of the body. The ventral sucker has a well-developed musculature, and lies in the anterior third of the body. It is rounded and measures 0.46 mm in transverse diameter. The genital pore occurs to the left of the oesophagus about half way between the median line and the lateral margin of the body. Little detail of the reproductive system has been made out, but a seminal vesicle can be seen lying dorsally to the ventral sucker. Whether this vesicle is enclosed in a cirrus-sac has not been ascertained. The testes lie behind the middle of the body in tandem, and are contiguous, transversely elongate and with indented margins. They measure (anterior testis) 0.46 mm wide × 0.23 mm and (posterior testis) 0.48 mm wide × 0.32 mm long. Immediately in front of the testes lies the transversely elongate ovary (0.39 mm × 0.15 mm). The vitelline fields contain numerous large, irregularly-shaped follicles. The fields reach from the oesophageal region to the posterior end of the body and are confluent in the median line behind the testes. They lie laterally, ventrally and dorsally to the caeca, encroaching slightly further towards the median line in the dorsal plane, and become confluent dorsally to the anterior margin of the ventral sucker. The uterus occupies the area between the ovary and the ventral sucker and contains operculate eggs measuring 93–94μm long × 52–54μm, each with a distinct boss on the anopercular pole.

It has not been possible to determine the generic position of the above-mentioned form, because the terminal complex of the male reproductive system is obscured in the whole mount. Nevertheless, superficially this worm is not unlike the previously-described species, *Pseudopecoelus pyriformis*, but differs considerably in egg-size.

Pseudopecoelus scorpaenae (Manter, 1947) Overstreet, 1969

Syn ?

55. **Neopecoelus scorpaenae** n. gen., n. sp.

Figs. 41, 42

HOSTS: *Scorpaena grandicornis* Cuv. & Val., scorpion fish; type host; 4 specimens in 2 of 4 hosts examined. *Scorpaena brasiliensis* Cuv. & Val., scorpion fish; 2 specimens in 2 of 19 hosts examined.

LOCATION: Intestine.

Description: Body smooth, 1.655 to 2.511 by 0.390 to 0.645 mm, almost uniform in width from acetabulum to posterior end, posterior end broadly rounded. Forebody 0.262 to 0.382 mm, or about 1/6 to 1/9 body length, tapering to oral sucker. Oral sucker round, 0.097 to 0.146 mm in diameter; acetabulum embedded in a fold of the ventral body-wall, without papillae, wider than long, 0.262 to 0.337 mm in transverse diameter. Sucker ratio 1:2.1 to 3, usually about 1:2.7. Short prepharynx present; pharynx 0.102 to 0.160 mm long by 0.077 to 0.122 mm wide, usually longer than wide, in one case same length as width; about the same size as the oral sucker or somewhat larger. Esophagus varying from about the same length as prepharynx to almost as long as the pharynx; bifurcation at anterior border of acetabulum; ceca narrow, each opening dorsally on one side of the excretory pore a short distance anterior to posterior end of body.

Genital pore slightly to the left at about midpharyngeal level. Testes two, subglobular, smooth, large, tandem, intercecal, slightly separated, just posterior to midbody. Cirrus a subspherical muscular structure, followed by an ovoid prostatic vesicle (Fig. 42). Cirrus sac absent. Prostatic cells free in parenchyma near prostatic vesicle and cirrus. Seminal vesicle tubular, free in parenchyma, becoming coiled or strongly sinuous posterior to acetabulum, extending dorsal to uterus almost halfway to ovary. Ovary smooth, ovoid, immediately anterior to anterior testis; seminal receptacle lacking; yolk reservoir to left of ovary; uterus preovarian, entering cirrus close to genital pore (Fig. 42). Metraterm somewhat longer than prostatic vesicle. Vitelline glands of large follicles extending in sides of body from posterior edge of acetabulum to posterior end of body, usually but not always interrupted opposite testes, not confluent between gonads, largely filling the body posterior to testes. Eggs 50 to 53 by 30 to 32 μ. Excretory pore subterminal, dorsal; extent of excretory vesicle not determined.

Generic Diagnosis of Neopecoelus: Opecoelidae with elongated, smooth body; acetabulum retractile into the body, without papillae; narrow ceca open through two ani which lie dorsally near posterior end. Testes subspherical, smooth, tandem; genital pore slightly to left of midline in pharyngeal region; cirrus subspherical; prostatic vesicle present; cirrus sac absent; seminal vesicle tubular; seminal receptacle absent; vitelline follicles extending posteriorly from acetabulum. Parasitic in the intestine of marine fishes. Type species: *N. scorpaenae.*

Comparisons: Neopecoelus is like *Pseudopecoelus* Von Wicklen, 1946 except that it possesses two ani. These ani are inconspicuous in preserved specimens but were clearly observed in living specimens. A cirrus sac or membrane is lacking in *Neopecoelus* and present but very weakly developed in *Pseudopecoelus*. *Fimbriatus* Von Wicklen, 1946 has two ani but differs in possessing an accessory sucker and papillae on the acetabulum.

Neopecoelus scorpaenae Manter, 1947
Host: Scorpaena plumieri (C). CURAÇAO
Site: intestine.

Our material is identified as this species even though the anal openings could not be confirmed by careful examination of living specimens or whole mounts. In some stained specimens, strands were seen extending posteriorly from the end of each cecum. In other respects, there is close agreement with the original description of the species except that interruption of the vitellaria at the level of each testis occurred in a minority of our specimens.

FROM NAHHAS AND CABLE (1964)

Pseudopecoelus scorpaenae 1969
(Manter, 1947) comb. n. Overstreet, 19
Neopecoelus scorpaenae Manter, 1947.

Host: *Scorpaena plumieri* (2 of 4).
Site: Posterior intestine and rectum.

Discussion: Seven wholemounts agree fairly well with the description of *Neopecoelus scorpaenae*. They are 1.3 to 2.0 long by 0.33 to 0.51 wide, sometimes widest at the acetabular level. The forebody is 17 to 21% of body length. The oral sucker is 0.09 to 0.12 long by 0.09 to 0.10 wide and the acetabulum is 0.16 to 0.20 by 0.22 to 0.28, with sucker ratios of 1:2.5 to 2.8. Eggs are partially collapsed and measure 49 to 54 by 30 to 34 microns. The genital pore is usually near the anterior level of the pharynx. The seminal vesicle passes to the left, right, or dorsal to the acetabulum before becoming strongly sinuous posterior to that sucker. Vitellaria extend from the middle of the acetabulum in one specimen, the posterior edge of the acetabulum in others. Temporary folds on the acetabulum of one specimen appear as but are not true papillae. The excretory vesicle extends a short distance anterior to the ovary.

Serial sagittal sections of a specimen did not reveal ani. Manter (1947:294) stated that they "are inconspicuous in preserved specimens but were clearly observed in living specimens." Nahhas and Cable (1964: 195) could not observe ani in either living or preserved material. Their absence places this species in the genus *Pseudopecoelus* where it differs from most species in lacking a lobed ovary. It is very similar, if not identical, to *P. barkeri* Hanson, 1950, from squirrel fishes. The posttesticular space in *P. scorpaenae* is slightly longer. There is apparently much variation in *P. barkeri*. Siddiqi and Cable (1960, Figure 93) illustrated a specimen with a sucker ratio of 1:1.6 and widely-interrupted vitellaria. Nahhas and Cable (1964:196) have specimens that differ from *P. tortugae* seemingly in size of eggs only. *Pseudopecoelus scorpaenae* differs from *P. elongatus* (Yamaguti, 1938) Von Wicklen, 1946, in anterior extent of vitellaria, shape and site of ovary, and size of pharynx; and from *P. manteri* Sogandares-Bernal and Hutton, 1959, in sucker ratio, anterior extent of vitellaria, and, probably, position of testes.

Because *N. scorpaenae* is the type species of *Neopecoelus* Manter, 1947, and I consider it a synonym of *P. scorpaenae*, *Neopecoelus* becomes a synonym of *Pseudopecoelus* Von Wicklen, 1946, and hence unavailable, requiring the erection of a new genus for *N. holocentri* Manter, 1947.

102. *Pseudopecoelus sphyraenae* ~~n. sp.~~ Yam., 1970
(Fig. 116)

HABITAT: Intestine of *Sphyraena barracuda* (type host) and *S. helleri*; Hawaii.

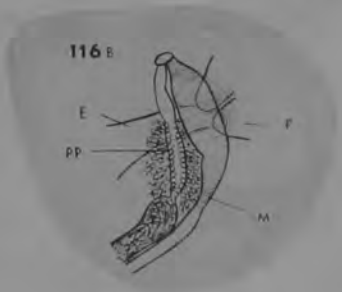
HOLOTYPE: U. S. Nat. Mus. Helm. Coll., No. 63723.

DESCRIPTION (based on ten whole mounts): Body subcylindrical, 3.2-5.9 X 0.25-0.56 mm, with very prominent, large, pedunculate acetabulum near anterior extremity. Oral sucker ventroterminal, 0.15-0.31 X 0.17-0.31 mm, followed by short but distinct prepharynx. Pharynx barrel-shaped, 0.06-0.16 X 0.065-0.15 mm; esophagus simple, 0.08-0.17 mm long; ceca simple, ending blindly at posterior extremity. Acetabulum thin-walled, with a deep notch on each lateral margin, 0.35-0.52 mm in diameter at its opening, nearly as deep as wide.

Testes oval, 0.19-0.54 X 0.15-0.31 mm, tandem in middle third of body, may be contiguous or separated a little by intervening vitellaria. Seminal vesicle tubular, swollen proximally (50-110 μ wide) at about anterior end of vitellaria, narrowed and convoluted at base of acetabular peduncle, straightened out further anteriorly. Cirrus pouch absent entirely. Pars prostatica cylindrical, narrower than distal end of vas deferens, with villous lining, about 65 μ long by 11.5 μ wide in the type, surrounded by prostate cells; cirrus simple, about 45 μ long in the type. Common genital pore ventral to pharynx or anterior part of esophagus.

Ovary ovoid, 0.08-0.22 mm in diameter, immediately in front of anterior testis or may be separated from it by vitellaria. Seminal receptacle absent. Laurer's canal containing yolk granules, running transversely immediately in front of ovary, winding distally, opening anterolateral to ovary. Uterus winding from side to side in intercecal field, but straightened out further anteriorly and running alongside male terminalia, where it is differentiated into the metraterm. Eggs oval, 46-56 X 28-40 μ in life. Vitellaria circumcecal, commencing immediately behind base of acetabular stalk, intruding mesad between ovary and anterior testis and also between two testes, without meeting in median line, and terminating at posterior extremity. Excretory vesicle tubular, reaching to dorsal side of ovary, where a pair of lateral collecting vessels are given off; excretory pore opening at tip of terminal projection of body.

DISCUSSION: This species very closely resembles *Pseudopecoelus priacanthi* (MacCallum, 1921) Manter, 1947 ("*Pseudopecoelodes priacanthi*" in Fig. 40, p. 398), from *Priacanthus* of Florida, especially in the character of the acetabulum, but differs distinctly in egg size. Manter gives the size as about 53 μ by 17 μ, but in the present species it is 46-56 μ by 28-40 μ, so that the eggs are definitely wider than they are in the Atlantic species, if the possibility of errors in measurements is excluded.



Pseudopecoelus tortugae Von Wicklen, 1946

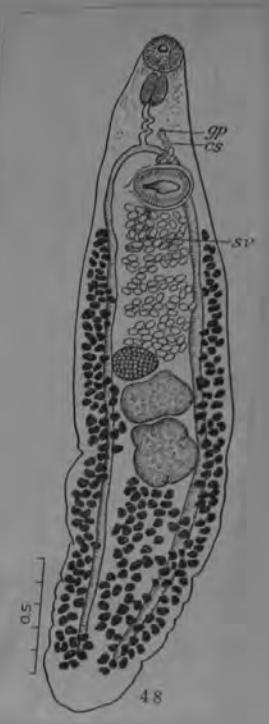
Syn *Cymbephallus fimbriatus* Linton, in press of Manter, 1934

(Fig. 48)

Host—~~Macrourus sp.~~ Coelorhynchus carminatus (Goode) or Chalinura accidentalis (Goode & Bean)
Position—Intestine.
Frequency—1 specimen in 1 of 5 hosts examined.
Depth—200 fathoms.

Description

Body flattened, elongate, tapering anteriorly, more or less rounded posteriorly; length 2.935 mm.; width 0.672 mm., unspined. Oral sucker terminal, 0.156 mm. in diameter; ventral sucker slightly extended transversely, with transverse aperture, 0.252 mm. in diameter; encircled by a fold of the body wall, probably protrusible. Forebody 0.520 mm. Short prepharynx; large elongate pharynx; esophagus about same length as pharynx or a little longer; intestinal bifurcation shortly in front of ventral sucker; ceca extending to near the posterior end, without ani. Genital pore somewhat to the left, approximately at midesophagus level; short, sucker-like cirrus and short prostate vesicle; no prostate gland; cirrus sac not evident; coiled, tubular seminal vesicle extending not quite halfway from ventral sucker to ovary. Testes large, slightly indented, median, immediately posterior to midbody, close together; posttesticular space about 1/3 body length (1.035 mm.). Ovary smooth, globular, immediately anterior to testes; vitelline glands chiefly lateral, but largely filling posttesticular area, not reaching ventral sucker anteriorly confluent around ends of ceca. Eggs almost colorless, thin-shelled, 57 to 66 by 39 to 44 μ.



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Discussion

Linton places in this species *Dist. vitellosum* of Linton, ~~1901~~ 1905, 388,390; figs. 176-178. The present specimen is referred to this species in spite of the fact that definite papillæ could not be discerned on the raised border of the ventral sucker. Linton has already mentioned that their appearance varies greatly from time to time and it is possible that more material would show their presence in the present form. Such papillæ are rather clearly absent in *C. vulgaris*, but possibly present here. The trematode is identified as *C. fimbriatus* for the following reasons: similar shape of the body, especially the rounded posterior end; similar shape of the testes and ovary; the anterior extent of the vitellaria is approximatly the same and differs from that of other species; similar egg size; similar esophagus length. Definite sucker measurements are not at present available for *C. fimbriatus*, but Linton's figure 176 (~~1901~~ 1905) shows sizes very much like those found in the present form.

Linton reports *C. fimbriatus* from *Menticirrhus saxatilis* at Woods Hole, Massachusetts, and from *Bairdiella chrysurus* and *Sciænops ocellatus* at Beaufort, North Carolina.

Another single, similar trematode from *Peristedion longispathum* could not be certainly identified as belonging to this species. It agreed in many respects, but the testes were separated by vitellaria and the ceca seemed to open to the outside.

Dichagenes

Syn Cymbephallus fimbriatus Linton of Manter 1934

Pseudopecoelus tortugae Von Wicklen, 1946 (FIGURE 94)

Synonym:
Cymbephallus fimbriatus Linton of Manter, 1934.
Host: **Apogon maculatus*.
Site: intestine.
Locality: Punta Arenas, P. R.
Deposited specimen: No. 39368.

The present material is in close agreement with Manter's (1934) description of *P. tortugae* except in body size and sucker ratio.

from Siddiqi and Cable, 1960

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from Fischthal & Thomas, 1970

Pseudopecoelus tortugae von Wicklen, 1946

SYNONYM: *Cymbephallus fimbriatus* of Manter, 1934, *nec* Linton, 1934.

HOSTS: *Trichiurus lepturus* L., horse-tail or ribbon fish (Trichiuridae); *Larimus peli* Bleeker (Sciaenidae).

HABITAT: Pyloric ceca.

LOCALITY: Cape Coast, Ghana.

DATES: 6, 8 December 1965 (*T. lepturus*) 8 December 1965, 7 February 1966 (*L. peli*).

SPECIMENS: USNM Helm. Coll. No. 70668 (from *T. lepturus*); No. 70669 (*L. peli*).

MEASUREMENTS and some pertinent data (based on 13 adults, six from *T. lepturus* and two from *L. peli* measured): Body 1,816–2,660 by 385–540, forebody 278–425 long, hindbody 1,498–2,070 long, forebody–hindbody length ratio 1:3.8–7.0; suckers round to somewhat longitudinally or transversely elongate, oral sucker 100–128 by 104–131, acetabulum 167–206 by 165–220, sucker length ratio 1:1.50–1.78, width ratio 1:1.26–1.94; prepharynx 12–24 long; pharynx transversely elongate, 65–77 by 77–97; esophagus 85–181 long; ceca terminating 56–175 from posterior extremity; anterior testis usually longitudinally elongate but may be transversely elongate, 158–300 by 163–260, lying 370–725 postacetabular; posterior testis usually transversely elongate but may be longitudinally elongate, 157–360 by 167–320, lying 535–980 postacetabular; posttesticular space 575–840 long; seminal vesicle commencing 198–280 postacetabular; genital pore sinistral to posterior half of pharynx; ovary dextral, round to somewhat longitudinally or transversely elongate, 103–150 by 109–140, lying 265–595 postacetabular; anterior limits of vitellaria at posterior part of acetabulum or slightly postacetabular; eggs yellow-brown, operculate, 24 measuring 46–56 by 28–36; excretory bladder conspicuously cell lined, extending anteriorly dorsal to gonads to ovarian level; excretory pore subterminal, dorsal, 4–19 from posterior extremity.

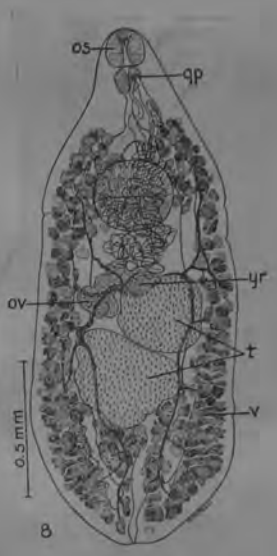
MEASUREMENTS and some pertinent data on four adults (USNM Helm. Coll. No. 39368) collected by Siddiqi and Cable (1960) from *Apogon maculatus* (Poey) (Apogonidae) from Puerto Rico: Body 1,013–1,192 by 310–335; forebody 191–227 long, hindbody 675–844 long, forebody–hindbody length ratio 1:3.4–4.4; oral sucker slightly transversely elongate, 70–80 by 82–87; acetabulum round to slightly longitudinally or transversely elongate, 140–157 by 140–160; sucker length ratio 1:1.93–2.0, width ratio 1:1.61–1.85; prepharynx 20–22 long (in two); pharynx transversely elongate, 50–54 by 58–69; esophagus 60–77 long; ceca terminating 80–123 from posterior extremity; testes transversely elongate; anterior testis 76–108 by 114–167; lying 210–320 postacetabular; posterior testis 85–121 by 123–157, lying 312–425 postacetabular; posttesticular space 157–305 long; seminal vesicle commencing 110–121 postacetabular; genital pore sinistral, at level of posterior part of pharynx or anterior part of esophagus; ovary transversely elongate, filling intercecal space or nearly so, 47–75 by 90–131, lying 210–260 postacetabular; anterior limits of vitellaria at posterior part of acetabulum or slightly postacetabular; eggs yellowish, operculate, 12 measuring 46–56 by 25–35; excretory bladder conspicuously cell lined, extending anteriorly dorsal to gonads to ovarian level; excretory pore dorsal, 51–90 from posterior extremity.

DISCUSSION: Our collection consists of one, two, and eight adult worms, respectively, from three of 13 *T. lepturus* examined, and one each from two of 30 *L. peli*. We are presenting further details of this species because Manter's (1934) description is based on a single specimen from a macrurid fish from Florida. Through the courtesy of Dr. Mary Hanson Pritchard, University of Nebraska, we were able to examine the only specimen (immature but well developed) of *P. tortugae* in the Harold W. Manter collection. Siddiqi and Cable (1960), without description, presented an illustration of a whole mount specimen, noting that their material was in close agreement with the original description of *P. tortugae* except in body size and sucker ratio. Their specimens differ further in having a differently shaped pharynx, an ovary considerably transversely elongate and filling the intercecal space or nearly so, and an excretory pore distinctly dorsal in position and relatively far removed from the posterior extremity. Manter's immature specimen shows the excretory bladder also extending to the ovarian level, but the pore is just subterminal dorsal; this condition is more like that found in our specimens. The shape of the pharynx and egg size in our specimens is similar to Siddiqi and Cable's material and unlike Manter's. In spite of the differences cited above for the three collections, we feel that they probably represent a single species. The differences may be host influenced or may represent genetic population variations. For example, our two worms from *Larimus peli* are 1,816 and 2,220 long, respectively, and have sucker length ratios of 1:1.78 and 1:1.74 and width ratios of 1:1.94 and 1:1.78, respectively; the six measured from *T. lepturus* are 2,050–2,660 long and have sucker length ratios of 1:1.50–1.68 and width ratios of 1:1.26–1.76.

PSEUDOPECOELUS UMBRINAE, new species Manter & Van Cleave, 1951

PLATE 12, FIGURES 8, 9

Description.—This species has the generic characters of *Pseudopecoelus*, namely: smooth body; acetabulum without papillae; no accessory sucker; ceca ending blindly; no cirrus sac; short cirrus; and tubular seminal vesicle. Length 1.037 to 2.420 mm.; greatest width (near posterior end or at acetabular region) 0.460 to 0.873 mm. Body tapering from acetabular level to anterior end, broadly rounded posteriorly. Forebody 0.292 to 0.584 mm. in length or approximately one-fourth body length; a little greater or a little less than posttesticular space. Oral sucker 0.124 to 0.190 mm. in transverse diameter; acetabulum 0.219 to 0.365 mm. in transverse diameter, slightly wider than long, with transverse aperture. Sucker ratio 1:1.65 to 2. Acetabulum usually slightly



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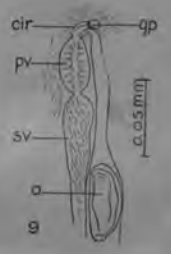
less than twice the diameter of oral sucker. Prepharynx short; pharynx 0.061 to 0.095 mm. in length by 0.075 to 0.124 mm. in width; length of esophagus one to two times length of pharynx; intestinal bifurcation a short distance anterior to acetabulum; ceca ending blindly a short distance anterior to posterior end of body.

Genital pore (gp, pl. 12, figs. 8, 9) muscular, slightly to left of midline at midpharyngeal level. Testes (t, pl. 12, fig. 8) large, tandem or slightly diagonal, close together, smooth or slightly irregular in outline. Posterior testis usually with a slightly indented outline. Cirrus (cir, fig. 9) very short; prostatic vesicle (pv) small and ovoid; seminal vesicle (sv) sinuous, somewhat more swollen posteriorly, extending dorsal to acetabulum to mid-acetabular level or to near posterior edge of acetabulum; cirrus sac lacking. Ovary 3- or 4-lobed (ov, fig. 8), partly to the right and partly anterior to anterior testis. Uterus beginning to left of ovary, mostly preovarian. Seminal receptacle and metraterm lacking. Vitelline follicles (v, fig. 8) large, extending from posterior end of esophagus to posterior end of body; lateral, dorsal, and ventral to ceca; anterior to acetabulum they are lateral and dorsal but only scantily dorsal to ceca; confluent posterior to testes; almost confluent anterior to acetabulum. Eggs 61 to 71μ (rarely to 80μ) by 27 to 49μ; collapsed eggs 61 to 68μ by 27 to 32μ; uncollapsed eggs near ovary and probably more nearly representing the size of living eggs, 68 to 71μ by 42 to 49μ. Excretory vesicle extending forward almost to ovary.



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Host.—*Umbrina roncador* Jordan and Gilbert, yellowfin croaker.

Location.—Intestine.

Types.—Holotype and paratype, U.S.N.M. Helm. Coll. No. 37146.

Discussion.—*P. umbrinae* differs from all species in the genus, except *P. gibbonsiae*, in that the vitellaria extend anterior to the acetabulum. It is the only species in which the seminal vesicle does not extend posterior to the acetabulum. The acetabulum is relatively larger than in *P. japonicus*, *P. elongatus*, or *P. tortugae*, and relatively smaller than in *P. vulgaris*. It differs from *P. gibbonsiae* in its lobed ovary, smaller pharynx, more flattened body, and much smaller eggs.

(over)

Pseudopecoelus vitellozonatus sp. n.
(Figs. 11—12) Pritchard, 1966

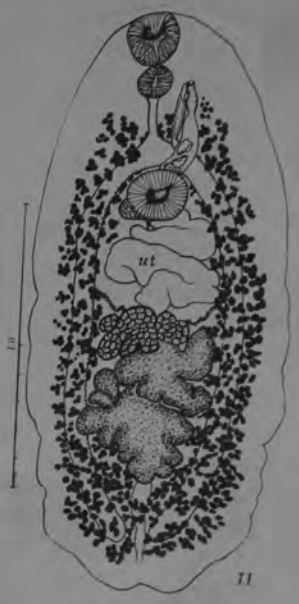
Hosts: *Naso unicornis* (Forskål), kala, unicorn fish (Acanthuridae), type host; 32 specimens from 2 of 23 hosts.

Holocentrus xantherythrus J. and E. (Holocentridae); 19 specimens from 6 of 45 hosts.

Location: Intestine.

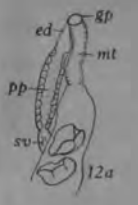
Holotype: No. 60351

Description (based on 20 specimens): Body 1.575 to 2.868 mm long by 0.603 to 1.005 mm wide, lateral edges often crenate; oral sucker round, 134 to 197 wide; acetabulum one-fourth to one-third body length from anterior end, rounded, 147 to 228 wide; sucker ratio 1 : 1.0 to 1.25. Prepharynx up to 67 long but often appearing absent, usually extending dorsally; pharynx rounded, 87 to 147 in diameter; esophagus 60 to 168 long; ceca extending to near posterior end of body, tips curving medianly, ending blindly.



Testes deeply and many lobed, more or less tandem although centers of respective masses slightly oblique, usually contiguous, near middle of hindbody; vasa efferentia enter base of seminal vesicle without forming vas deferens; seminal vesicle tubular, coiled, ending dorsal to posterior half of acetabulum or slightly more posteriorly; pars prostatica (Fig. 12) variable, 72 to 140 long; ejaculatory duct short; cirrus sac absent. Genital pore muscular, ventral, to left of pharynx or anterior end of esophagus.

Ovary basically three-lobed but secondary lobing frequent, pretesticular, median or slightly dextral, usually contiguous with anterior testis; seminal receptacle absent, but varying quantities of sperm cells present in proximal coils of uterus; Laurer's canal winding posteriorly from ovary, pore to left of median line and dorsal to anterior testis; Mehlis' gland preovarian; uterus preovarian, coiled; metraterm short; eggs yellow, somewhat collapsed, 58 to 77 by 32 to 48; colorless eggs near ovary more rounded, 56 to 74 by 42 to 64. Vitelline follicles dorsal, lateral, and ventral to ceca; confluent dorsal to cecal bifurcation and posterior to testes; anteriormost follicles near level of genital pore.



Excretory pore terminal or slightly dorsal; stem short, sometimes appearing glandular; vesicle tubular, extending forward to level of ovary.

The name *vitellozonatus* is from *vitellus*, yolk, and *zona*, belt, and refers to the band of vitellaria dorsal to the cecal bifurcation.

Discussion: *Pseudopecoelus umbrinae* Manter and Van Cleave, 1951, and *P. brevivesiculatus* Hanson, 1955, are the only other species of this genus with a lobed ovary and vitellaria extending anterior to the acetabulum. The closely related *P. umbrinae* from La Jolla, California, has vitellaria almost confluent anterior to the acetabulum, seminal vesicle ending dorsal to the acetabulum, and lacks a cirrus sac, but differs in having a larger sucker ratio, less lobed testes and ovary, and position of the ovary. *P. brevivesiculatus*, also from Hawaii, differs in the presence of a cirrus sac, nonconfluent vitellaria in the forebody, less coiled seminal vesicle, and slightly smaller eggs.

103. *Pseudopecoelus vitellozonatus* Pritchard, 1966
(Fig. 117)

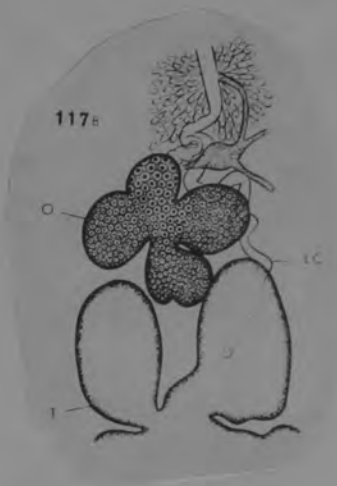
HABITAT: Small intestine of *Holocentrus lacteoguttatus*, *H. spinifer*, *H. scythrops*, and *H. xantherythrus* (first three hosts are new); Hawaii.

DESCRIPTION (based on 26 whole mounts): Body elongate, crenated laterally in hindbody, 1.3-3.1 X 0.4-1.1 mm. Oral sucker ventroterminal, 0.08-0.19 X 0.11-0.22 mm; prepharynx distinct; pharynx strongly muscular, 60-110 X 80-150 μ; esophagus 0.08-0.3 mm long. Acetabulum comparatively small, not pedunculate, 0.1-0.22 mm in diameter, situated at posterior part of anterior third of body or a little more posteriorly.

Testes deeply lobed, 0.1-0.43 X 0.15-0.6 mm, directly tandem about middle of hindbody. Vasa efferentia uniting together at posterior end of seminal vesicle; seminal vesicle tubular, winding, ending dorsal to acetabulum. Pars prostatica fusiform to cylindrical, well provided with longitudinal and circular muscles, 30-37 μ wide, followed by short ejaculatory duct. No distinct cirrus pouch. Genital pore to left of anterior end of esophagus, 0.18-0.4 mm from head end.

Ovary 3- to 5-lobed, 0.09-0.25 X 0.11-0.4 mm, immediately pretesticular, median or slightly dextral. Seminal receptacle absent. Laurer's canal running obliquely backward and opening dorsal to anterior testis to left of median line. Shell gland and vitelline reservoir preovarian. Uterus winding from side to side in intercecal field between shell gland and acetabulum. Metraterm well differentiated, inflated in one specimen to an elliptical bulb before opening into common genital pore; eggs 60-82 X 37-56 μ in life. Vitelline follicles circumcecal, extending as far as level of esophagus, may or may not be confluent dorsal to intestinal bifurcation. Excretory vesicle tubular, reaching to anterior end of ovary, with dorsosubterminal aperture.

DISCUSSION: Our specimens agree completely with Pritchard's original description of this species.



PSEUDOPECOELUS

Pseudopodocotyle bravoae
~~gen. nov., sp. nov.~~ Caballero, 1972

Estos parásitos presentan su cuerpo piriforme u ovoideo, con los extremos redondeados y con la cutícula lisa y transparente; miden de 1.982 a 3.177 mm de largo por 1.108 a 1.1[illegible]8 mm de ancho. La ventosa oral, menor que el acetábulo, es subterminal y musculosa, mide de 0.074 a 0.090 mm de diámetro ánteroposterior, por 0.222 a 0.285 mm de diámetro transversal; el acetábulo está situado en la mitad anterior del cuerpo, por detrás de la bifurcación intestinal y de la bolsa del cirro; dista de 0.690 a 0.765 mm del borde anterior del cuerpo; es casi esférico, musculoso, mide 0.296 a 0.390 de diámetro ánteroposterior por 0.314 a 0.397 mm de diámetro transversal. La relación entre los diámetros de estas ventosas es 1:4.3 x 1:1.3 a 1:4 x 1:1.4.

La boca es pequeña y terminal, mide de diámetros de 0.111 x 0.129 mm a 0.055 x 0.092 mm; existe una prefaringe cónica que mide de 0.074 a 0.074 mm de diámetro ánteroposterior por 0.092 a 0.111 mm de diámetro transversal; la faringe pequeña, cilíndrica y musculosa, mide de 0.092 a 0.111 mm de diámetro ánteroposterior por 0.118 a 0.141 mm de diámetro transversal; el esófago, largo y con ligeras estrías tranversales, mide de 0.225 a 0.259 mm de largo por 0.037 a 0.045 mm de ancho; la bifurcación intestinal se encuentra a nivel de la mitad de la bolsa del cirro y dista de 0.510 a 0.525 mm del borde anterior del cuerpo; los ciegos intestinales son tubos cilíndricos, rectos, que se extienden hasta el nivel ecuatorial del testículo posterior, miden de 0.060 a 0.075 mm de ancho.

Los poros reproductores se encuentran situados lateralmente, sobre el lado izquierdo del cuerpo, al nivel de la porción terminal del esófago y distan de 0.375 a 0.525 mm del borde anterior del cuerpo; los testículos, aún no bien desarrollados, están situados en el ecuador del cuerpo, ligeramente por detrás del ovario, en posición oblicua e intercecal, son ovoideos y piramidales, de bordes lisos, el anterior mide de 0.180 a 0.285 mm de diámetro ánteroposterior por 0.150 a 0.375 mm de diámetro transversal, y el posterior de 0.165 a 0.300 mm de diámetro ánteroposterior por 0.180 a 0.210 mm de diámetro transversal; la bolsa del cirro, cuerpo ovoideo, de paredes gruesas, se extiende oblicuamente en el área comprendida entre la bifurcación intestinal y el borde anterior del acetábulo, mide de 0.345 a 0.420 mm de largo por 0.105 a 0.210 mm de diámetro tran-

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mm de largo por 0.033 a 0.033 mm de ancho.

La glándula vitelógena es muy extensa, se extiende desde el nivel del borde posterior de la faringe hasta la mitad de la distancia entre la terminación de los ciegos intestinales y el borde posterior del cuerpo; está compuesta de numerosos folículos lobulados, cilíndricos, los cuales ocupan preferentemente las áreas extracecales del cuerpo, pero algunos folículos son cecales e intercecales, principalmente por detrás de los órganos reproductores. El poro excretor se abre en el borde medio posterior del cuerpo y de él parte una vesícula excretora ancha, sacciforme que se extiende hasta por detrás del ovario; en algunos ejemplares del parásito, este órgano es aún embrionario.

versal; la vesícula seminal ocupa toda la mitad posterior de la bolsa del cirro, se presenta replegada varias veces, mide de 0.166 a 0.222 mm de largo por 0.063 a 0.115 mm de ancho; la porción anterior de este órgano está ocupada por el conducto eyaculador, cilíndrico, de paredes finas con estrías transversales y rodeado por las células de una glándula prostática; existe un cirro que mide de 0.074 a 0.139 mm de largo por 0.015 a 0.018 mm de ancho.

El ovario se encuentra situado en el ecuador del cuerpo sobre el lado derecho, por delante del testículo del mismo lado y del borde proximal de la vesícula excretora; es redondeado y de bordes irregulares, mide de 0.081 a 0.165 mm de diámetro ánteroposterior por 0.148 a 0.165 mm de diámetro transversal; la glándula de Mehlis y el ootipo se hallan situados inmediatamente por delante del ovario, pero sobre la línea media del cuerpo; existe un receptáculo seminal; el útero ocupa únicamente el área intercecal comprendida entre los bordes anteriores del ovario, de la vesícula excretora, del testículo anterior y el borde posterior del acetábulo: los huevecillos, escasos, grandes, de cáscara amarillenta y transparente, miden de 0.052 a 0.063

0.4 mm.

Hospedador: *Pseudothelphusa* (*Ptychophallus*) *tristani* (Rathbun, 1896). Crustacea Linn. 1758, Fam. Potamonidae. (Cangrejo de agua dulce).

Localización: Hepatopáncreas.

Localidad: Balsa de Atenas, Atenas, Provincia de Alajuela, Costa Rica, América Central.

Holotipo: Colección helmintológica de E. Caballero y C. No. 514.

Paratipos: Colecciones helmintológicas de E. Caballero y C. No. 515; del Laboratorio de Helmintología del Instituto de Biología de la Universidad Nacional Autónoma de México No. 225-25 y en el Laboratorio de Helmintología de la Facultad de Microbiología, de la Universidad de Costa Rica.

Se dedica esta nueva especie a la señorita M. en C. Margarita Bravo Hollis como un justo reconocimiento de la magnífica labor desempeñada en el campo de la Helmintología y a la constancia en la docencia y en la investigación por más de treinta y cinco años.

Opecoelidae

Pseudopodocotyle ~~gen. nov.~~ Caballero, 1972

Opecoelidae. Cuerpo alargado, con cutícula desprovista de espinas; ventosa oral subterminal; acetábulo más grande que la ventosa oral, no pedunculado, situado después de la bifurcación intestinal, en el área intercecal; faringe grande; longitud del esófago, aproximadamente dos veces la de la faringe; bifurcación intestinal por delante del acetábulo; ciegos intestinales tubulosos, angostos y extendiéndose hasta el nivel del testículo posterior. Poro reproductor siniestro, a la mitad de la distancia entre el extremo posterior del esófago y el borde lateral izquierdo del cuerpo; bolsa del cirro ovoidea, pequeña, situada entre el borde anterior del acetábulo y el poro reproductor; vesícula seminal ocupando la mitad posterior de la bolsa del cirro, circunvoluta; presencia de próstata y cirro; testículos en el área intercecal por detrás del ecuador del cuerpo, oblicuamente uno detrás del otro, ovoideos o piramidales y lisos. Ovario pretesticular, ecuatorial, intercecal, sobre el lado derecho de la línea sagital del cuerpo, ovoideo o cordiforme; ootipo y glándula de Mehlis preováricos, en el área media intercecal; existe un pequeño receptáculo seminal preovárico y mediano; útero en la zona intercecal, entre ovario y testículo anterior y borde posterior del acetábulo; un corto metratermo paralelo a la bolsa del cirro; huevecillos grandes y escasos, operculados. Glándulas vitelógenas con múltiples folículos que se extienden desde el nivel de la faringe hasta por detrás del testículo posterior, en las áreas extracecales, cecales e intercecales; presencia de un pequeño receptáculo vitelino; vesícula excretora en forma de "I" que se extiende desde el poro excretor, el cual es terminal, hasta el nivel del ovario y del testículo anterior.

Especie tipo: *Pseudopodocotyle bravoae* gen. nov. sp. nov.

Habitat: En forma de metacercaria progenética en el hepatopáncreas de Crustacea de agua dulce.

Discusión. Se considera que este género es nuevo dentro de la subfamilia Plagioporinae Manter, 1947 atendiendo a los siguientes caracteres: 1º, forma y posición del poro reproductor y de la bolsa del cirro; 2º, posición del útero; 3º, extensión de los ciegos intestinales y 4º,

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extensión de las glándulas vitelinas. Se trata de una metacercaria progenética en hospedadores de agua dulce, atendiendo al hecho bioecológico de poseer órganos reproductores con madurez sexual morfológica y fisiológica dentro del quiste. La vesícula excretora, en vías de desarrollo, se encuentra llena de células de una estirpe no identificada, y los ciegos intestinales por muchas células de núcleos redondos, dispuestos en hileras. Se desconoce el parásito adulto y el hospedador definitivo.

ABSTRACT

A progenetic metacercaria of a digenetic trematode is described, belonging to the family Opecoelidae Ozaki, 1925, to *Pseudopodocotyle bravoae* gen. nov., sp. nov., inhabiting the hepatopancreas of a freshwater crustacean *Pseudothelphusa* (*Ptychophallus*) *tristani* (Rathbun, 1896). Adult and definitive host unknown.
This genus is characterized by: shape and position of cirrus sac; position of reproductive pore; location of uterus; extension of intestinal caeca and of vitelline glands. Reproductive organs have reached sexual maturity organically and physiologically; excretory vesicle is filled with cellular compact tissue; intestinal caeca also occupied by cells with round nuclei.


PSEUDOPODOCOTYLE

Pseudozakia ~~n. g.~~ MACHIDA, 1977

Opecoelidae, Opecoelinae. Body linguiform, with squamae except for posterior part. Oral sucker subterminal, large, cup-shaped; prepharynx short; pharynx well-developed; esophagus short; caeca united posteriorly. Acetabulum small, at anterior end of middle third of body. Testes irregularly lobed, directly tandem in anterior part of posterior third of body. Seminal vesicle tubular, winding posteriorly, reaching near equator of body. No cirrus pouch. Pars prostatica rudimentary, ejaculatory duct slender. Genital pore submedian, between caecal bifurcation and acetabulum. Ovary lobate, submedian, pretesticular. No seminal receptacle. Laurer's canal and receptaculum seminis uterinum present. Vitellaria co-extensive with caecum. Uterus winding transversely, intercaecal, between ovary and acetabulum. Excretory vesicle tubular, reaching near caecal bifurcation. Intestinal parasites of marine teleosts.

Type-species: *Pseudozakia hatampo* n. sp.

Pseudozakia hatampo ~~n. g., n. sp.~~ MACHIDA, 1977

(Figs. 7–9)

Host. *Pempheris xanthoptera* TOMINAGA.

Habitat. Small intestine.

Locality. Tanegashima Island, Kagoshima Prefecture, southern Japan.

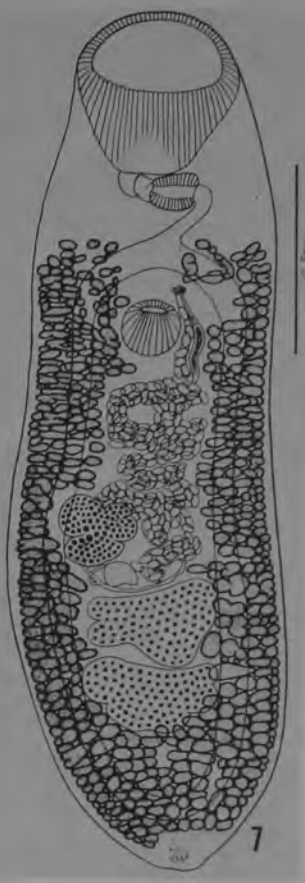
Date. 12–XI–1974.

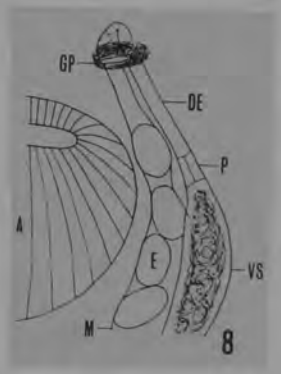
Specimen No. NSMT–Pl–1695.

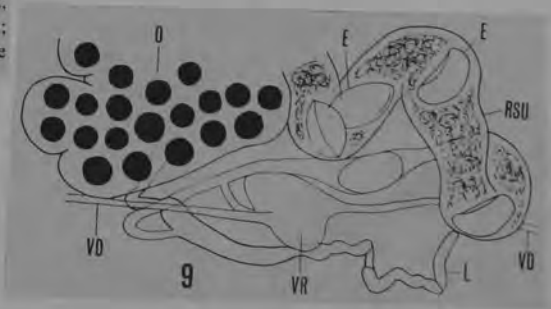
Description. Body linguiform, 1.70–2.56 mm long and 0.60–0.75 mm wide. Cuticle with squamae except for posterior part of body. Oral sucker subterminal, very large, cup-shaped, 0.310–0.434×0.306–0.459 mm; prepharynx short, 0.054–0.072 mm long; pharynx oval, 0.102–0.138×0.092–0.112 mm; esophagus 0.115–0.187 mm long, bifurcating about midway between two suckers; caeca united posteriorly at about middle of posttesticular field. Acetabulum small, rounded, 0.112–0.153×0.138–0.179 mm, at anterior end of middle third of body. Sucker ratio 1 : 0.35–0.45. Testes irregularly lobed, transversely elongated, sometimes with incisions, directly tandem in anterior part of posterior third of body; anterior testis 0.138–0.230×0.245–0.357 mm, posterior testis 0.128–0.265×0.245–0.367 mm. Each vas efferens united at some distance anterior to ovary to form vas deferens. Seminal vesicle long tubular, winding posteriorly, reaching near equator of body. Pars prostatica short, rudimentary, 0.025–0.030 mm long; ejaculatory duct slender, 0.030–0.10 mm long. Genital pore left to midline, between caecal bifurcation and acetabulum. Ovary lobate, 0.112–0.255×0.189–0.255 mm, antero-dextral to anterior testis. Oviduct arising from central part of ovary, giving off Laurer's canal and united with duct of vitelline reservoir to lead into receptaculum seminis uterinum. Laurer's canal opening dorsally in antero-sinistral to anterior testis. Vitelline follicles surrounding caeca mainly on ventral and lateral side. Vitelline reservoir conical, postero-sinistral to ovary. Uterus winding transversely, intercaecal, between lateral side of ovary and acetabulum; metraterm running left to acetabulum. Uterine eggs oval, thin-shelled, embryonated, 0.042–0.049×0.025–0.031 mm. Excretory vesicle tubular, extending to near caecal bifurcation; pore dorsal, close to posterior extremity of body.

This species is divided into two types owing to the position of the ovarian complex and the terminal genitalia. In one type, as described above, the ovary lies right to the midline and the genital pore left to the midline, whereas in the other type, they are situated bisymmetrically against those of the former type. The two types appear at the rate of half-and-half.

Discussion. This genus resembles *Ozakia* in the caecum united posteriorly, but differs from it in having no cirrus pouch, in the genital pore lying at submedian between caecal bifurcation and acetabulum, and the excretory vesicle reaching near the caecal bifurcation. In *Ozakia*, the cirrus pouch is rudimentary but encloses more or less weakly developed pars prostatica and short ejaculatory duct, the genital pore lies submedian at the level of esophagus, and the excretory vesicle extends to the shell gland. In respect of the male terminal genitalia, this genus resembles *Pseudopecoelus*, which







7–9. *Pseudozakia hatampo* n. g., n. sp. —— 7. Entire worm, ventral view. —— 8. Terminal genitalia, ventral view. —— 9. Ovarian complex, ventral view. A, acetabulum; DE, ductus ejaculatorius; E, egg; GP, genital pore; L, Laurer's canal; M, metraterm; O, ovary; P, pars prostatica; RSU, receptaculum seminis uterinum; VD, vitelline duct; VR, vitelline reservoir; VS, vesicula seminalis.

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has no true cirrus pouch or prostatic gland. In *Pseudopecoelus*, however, the caecum terminates blindly, the genital pore lies at the level of pharynx or esophagus, and the excretory vesicle extends to the ovary.

PSEUDOZAKIA

III. Genus *Staffordiella* MEHRA, 1966

Chatterji (1956) described *Psilostomum chilkai* Chatterji, 1956 from the small intestine of fish *Lates calcarifer* of Chilka lake, Orissa. This species does not belong to Psilostomidae, 1913, but it belongs to Opecoelidae Ozaki, 1925. It comes under the subfamily plagioporinae belonging to a new genus *Staffordiella*, which differs from all the genera of this subfamily except *Euycreadium* Manter, 1934, and *Plagiocirrus* Van cleave and Mueller, 1932 in absence of the receptaculum seminis. It, however, differs from *Euycreadium* in the tandem position of the testes and the entirely preacetabular cirrus sac. In *Euycreadium* the testes are symmetrical or diagonal and the cirrus sac overlaps the acetabulum. The caeca are half long not extending behind testes; the vitellaria are also shorter extending from level of pharynx to testicular zone. In *Staffordiella* n. g. the caeca reach to the posterior extremity and the vitellaria extend from anterior level of pharynx to the hind end of the body over which they are spread in the posttesticular region.

Diagnosis : Plagioporinae: Body elongate, cylindrical, unspinulate. Acetabulum subequal to oral sucker, subequatorial. Pharynx continuous to oral sucker, i. e. prepharynx absent; oesophagus short; caeca terminating near posterior extremity. Testes tandem, postequatorial. Cirrus sac well developed, preacetabular, almost median, containing large vesicula seminalis, poorly developed pars prostatica and long protrusible unarmed cirrus. Genital pore median, immediately behind intestinal bifurcation. Ovary pretesticular, sinistral, immediately postacetabular. Receptaculum seminis absent. Mehlis' gland large, median immediately postovarian. Uterus small, consisting of a few coils between anterior testis and acetabulum; eggs large. Vitellaria of small follicles from anterior level of pharynx to posterior extremity, extracaecal and intercaecal, spreading mesially in posttesticular region. Parasitic in small intestine of brackish water fishes (Chilka lake).

Genotype : *S. chilkai* (Chatterji, 1956) syn. *Psilostomum chilkai* Chatterji, 1956

The genus is named after J. Stafford for his contributions to the knowledge of Allocreadioidea of Canadian fishes.

STAFFORDIELLA CHILKAI (CHATTERJI, 1958) MENRA, 1966

SYN: PSILOSTOMUM CHILKAI N. SP. Chatterji, 1958

About forty specimens of this parasite in different stages of maturation were collected at Chilka lake from the small intestine of a bekti fish, *Lates calcarifer*. Only one of the two fishes examined was found infected with this parasite.

Living worms were a dirty white and showed considerable degree of contraction and expansion. Eggs were seen coming out of the genital opening during each contraction of the body. Body long, cylindrical, with a broad anterior end, 1.736-3.01 mm. in length and 0.588-0.952 mm. in maximum breadth in the acetabular region. Cuticle aspinose.

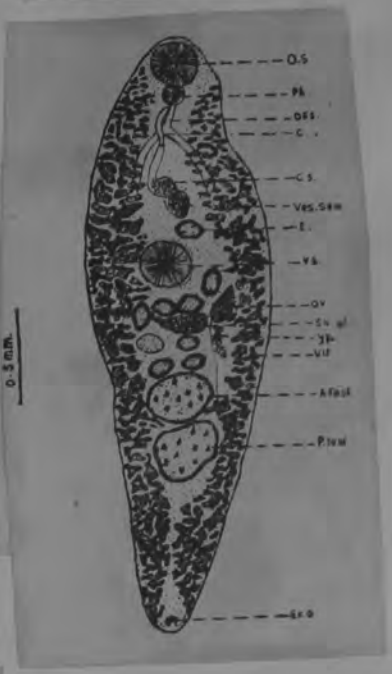
Oral sucker terminal, spherical, 0.192-0.238 mm. by 0.210-0.238mm. Pharynx spherical, contiguous to oral sucker, 0.048-0.112 mm. by 0.084-0.112mm.; œsophagus short, 0.14mm. long; intestinal caeca run parallel to the body wall almost to the hind end of the body; they could not be seen throughout their length due to the overlapping of the vitelline follicles. Acetabulum spherical, of the same size as oral sucker, lying near the equatorial region.

Testes tandem, in the postequatorial region. Anterior testis spherical, 0.196-0.28mm. by 0.196-0.346mm., lying 0.168-0.448mm. behind the acetabulum. Posterior testis slightly broader than long, almost contiguous with the anterior testis, 0.168-0.28mm. by 0.21-0.364 mm., lying 0.28-0.77 mm. in front of hind end. Cirrus sac well developed, preacetabular, 0.298 mm. long, and the vesicula seminalis interna completely fills the cirrus sac. Pars prostatica and ductus ejaculatorius were not seen properly. The unarmed cirrus, 0.16 mm. long, was seen protruding from the genital opening.

Ovary longitudinally ovoid, pretesticular, markedly towards the left of the median line, 0.096-0.196mm. by 0.084-0.108 mm. Mehlis' gland, slightly bigger than ovary, in the same zone in the median line. Yolk reservoir small, seen immediately behind the ovary. Uterus very small, consisting of a few coils restricted between the anterior testis and the acetabulum. Eggs large, operculate, yellowish brown, 0.14-0.154mm.by 0.070-0.098mm. The common genital opening is median and lies immediately behind the intestinal bifurcation. Vitellaria consist of small follicles recurring over the caecal, extracaecal and intercaecal regions. They extend from the anterior level of the pharynx to the hind end of the body over which they spread in the post-testicular region.

Discussion :—The new species was collected from a fish at the Chilka lake so the name of the species has been given *Psilostomum chilkai* n. sp. The new species resembles the type species *P. platyurum* (Mühling, 1896) Looss, 1899 in having a similar topography of organs, almost sub-equal suckers, in the coalescence of the vitelline follicles behind the gonads, and in having a long cirrus sac with a long protruding cirrus; but it can be differentiated by the different shape and size of the body, a shorter œsophagus, and the different anterior extension of the vitelline follicles (Vitellaria in the new species start from the pharyngeal region whereas in the type species they start from behind the ventral sucker) and the cirrus sac.

Why not Allocreadium ?



P. chilkai n. sp. differs remarkably from *P. cygnei* Southwell and Krishnei, 1937, by most of the characters mentioned above and in addition the following characters: body more or less cylindrical in the new species and more or less U shaped in *P. cygnei*, two suckers of sub-equal size in the new species whereas the ventral sucker in *P. cygnei* is about twice the size of the oral sucker.

(over)

P.chilkai can be differentiated from all other known species of Psilostomum by thevitelline follicles extending upto the pharyngeal region, its long cirrus sac with a long protruding cirrus, well in front of the ventral sucker, and in having very few eggs which are larger and well developed.

Host: Lates calcarifer; intestine; Chilka Lake, Orissa, India

STAFFORDIELLA

Stenopera Manter, 1933

Generic diagnosis. — Allocreadiidae, Allocreadiinae: Body somewhat elongate. Oral sucker small, directly followed by ovoid pharynx. Esophagus rather short; ceca narrow, terminating at posterior extremity. Acetabulum near anterior extremity. Testes tandem, postequatorial, slightly lobed. Cirrus pouch slender, curved, very long, reaching far back of acetabulum, enclosing tubular seminal vesicle, winding ejaculatory duct surrounded by prostate cells, and cirrus. Genital pore median or submedian, anterior to intestinal bifurcation, near base of pharynx. Ovary lobed, just in front of anterior testis. Receptaculum seminis anterior to ovary. Laurer's canal? Vitellaria lateral, confined to hindbody. Uterus in diagonal spirals between ovary and acetabulum; metraterm differentiated; eggs with unipolar filament. Excretory vesicle extending to level of ovary; pore dorsoterminal. Intestinal parasites of marine fishes.

Genotype: *S. equilata* Manter, 1933 (Pl. 35, Fig. 455), in *Holocentrus ascensionis;* Florida.

Results

THE STATUS OF *Stenopera* Manter, 1933

Stenopera was erected to accommodate ***S. equilata***. The distinguishing characteristics stated were the short forebody and a cirrus sac which extends far posterior to the acetabulum. The second species, *S. pteroisi*, was described by Gupta (1956). Siddiqi and Cable (1960) were of the opinion that the characteristics of *Stenopera* were of a specific nature and reduced it to synonymy with *Helicometra*, making the necessary recombination in the case of *S. equilata* but not mentioning *S. pteroisi*. In 1964, Fischthal and Kuntz, either unaware of the work of Siddiqi and Cable or not in agreement with it, described *S. rectisaccus*. In a later work, Fischthal and Kuntz (1965) concurred with the opinions of Siddiqi and Cable and transferred *S. pteroisi* and *S. rectisaccus* to *Helicometra*. However, Pritchard (1966) resurrected *Stenopera* believing that the genus was, at least, convenient for separating these species from all other species of *Helicometra*. In addition to those species which had been originally referred to *Stenopera*, Pritchard transferred *H. boseli* Nagaty, 1956 and *H. nasae* Nagaty and Abdel Aal, 1962 to it. Yamaguti (1970) expressed doubt about the validity of *Stenopera* and preferred to retain the original taxon, *H. boseli*, but in 1971 he recognized *S. equilata*, *S. pteroisi*, and *S. boseli*. Hafeezullah (1971) was of the opinion that *Stenopera* is invalid and upheld the synonymy by Siddiqi and Cable (1960).

While recognition of *Stenopera* may be convenient, the present study indicates that forebody length is quite variable and that several species normally referred to *Helicometra* are now reported to possess a cirrus sac which extends slightly posterior to the acetabulum in some specimens. Therefore, we concur with Siddiqi and Cable (1960) and Hafeezullah (1971) and recognize *Stenopera* as a synonym of *Helicometra*.

FROM SEKERAK AND ARAI, 1974

Siddiqi and Cable 1960 do not consider *Stenopera* as a genus distinct from *Helicometra* on the basis of a shorter forebody and a long cirrus sac extending posterior to acetabulum in the former. According to them, these two characters are specific rather than generic and therefore, they synonymised *Stenopera* with *Helicometra*. Fischthal and Kuntz 1965 concur with this synonymy. However, Pritchard 1966 does not agree with this conclusion and retains *Stenopera*, listing under it five species with short forebody and a cirrus sac extending well posterior to the acetabulum. According to her, these five species can be conveniently grouped together and separated from the species of *Helicometra*. Overstreet 1969; in his collection of *H. torta* Linton, 1910 found variable characters intermediate between it and *H. pretiosa* Bravo-Hollis et Manter, 1957 and consequently be synonymised the latter with the former. *Helicometra bassensis* Woolcock, 1935 has a short forebody unlike other species of *Helicometra*. Further, in *H. torta* (*H. pretiosa*), the forebody is short and the cirrus sac, although not very long, may or may not extend slightly posterior to the acetabulum. Moreover, these species have elongated body like that of the species grouped under *Stenopera*. These examples occupy an intermediate position between clearcut species of *Helicometra* and those listed under *Stenopera*, and serve to support the view that short forebody and cirrus sac extending posterior to the acetabulum are not sufficient a basis to consider *Stenopera* distinct from *Helicometra*.

From Hafeezullah, 1971

The Genus STENOPERA from Pritchard, 1966

Discussion: MANTER (1933) named the genus *Stenopera* for an *Helicometra*-like species with a short forebody and cirrus sac extending posterior to the acetabulum. SIDDIQI and CABLE (1960) considered these differences only specific and synonymized *Stenopera* with *Helicometra* ODHNER, 1902, a synonymy with which FISCHTHAL and KUNTZ (1965) concur. There are, however, five elongate species which agree in having a short forebody and long cirrus sac. The genus *Stenopera* is convenient for separating them from all other species of *Helicometra*. The five species are: *Stenopera equilata* MANTER, 1933, type species (Caribbean); *S. pteroisi* N. K. GUPTA, 1956 (India); *S. boseli* (NAGATY, 1956) n. comb. (syn. *Helicometra boseli* NAGATY) (Red Sea and Hawaii); *S. nasae* (NAGATY and ABDEL AAL, 1962) n. comb. (syn. *Helicometra nasae* NAGATY and ABDEL AAL), (Red Sea); and *S. rectisaccus* FISCHTHAL and KUNTZ, 1964 (Philippines). These species are much alike but may be separated by the following key:

1 (2) Vitellaria extending into acetabular zone 3
2 (1) Vitellaria not extending into acetabular zone 5
3 (4) Ovary 4-lobed, immediately pretesticular . . . . . *boseli*
4 (3) Ovary 7-lobed, considerably anterior to testes . . . . . *pteroisi*
5 (6) Cirrus sac extending halfway between acetabulum and ovary . *equilata*
6 (5) Cirrus sac extending relatively short distance posterior to acetabulum 7
7 (8) Cirrus sac curving laterally around acetabulum, sucker ratio 1 : 1.1 to 1.17 . . . . . *nasae*
8 (7) Cirrus sac lying on median line, sucker ratio 1 : 1.25 to 1.47 . . *rectisaccus*

Stenopera rectisaccus is probably a synonym of *S. nasae*. The differences between them are likely to be individual variations.

Stenopera boseli was originally reported from *Holocentrus sammara* (FORSKÅL) from the Red Sea. The same host species occurs in Hawaii, but was not among the fish examined for parasites. Two paratypes of *H. boseli* are present in the H. W. Manter Collection. The Hawaiian specimens agree in all respects except that the cirrus sac is more slender, the seminal vesicle is somewhat more tubular and coiled, and the suckers are somewhat larger although the sucker ratio is the same.

Allocreadiidae

Helicometra

(syn. STENOPERA Manter, 1933) syn by Siddiqi + Cable, 1960

DIAGNOSIS OF GENUS STENOPERA

Allocreadiinæ of somewhat elongate body form; ventral sucker rather far forward; esophagus of moderate length; ceca narrow, extending to posterior end; genital pore median or submedian, anterior to intestinal bifurcation, near base of pharynx; cirrus sac slender, curved, very long, extending posteriorly behind ventral sucker; testes tandem, median, slightly lobed; vitellaria lateral, confluent behind testes, not extending anteriorly to ventral sucker; yolk reservoir and seminal receptacle anterior to the ovary; uterus in diagonal spirals between ovary and ventral sucker; metraterm present, shorter than cirrus sac; eggs with unipolar filaments; excretory vesicle extending to level of ovary. Intestinal parasites of marine fishes. Type species: *Stenopera equilata.*

This genus, with its filamented eggs, is most closely related to *Helicometra.* It differs from all species of *Helicometra,* however, in the shape and great length of the cirrus sac; in its elongate body with sides nearly parallel; and in the far anterior position of the ventral sucker. It was at first planned to include the trematode in the genus *Helicometra,* but the strikingly different relationship of the ventral sucker to the cirrus sac is considered to be a generic character. This morphological change is brought about not only by the more forward position of the ventral sucker but also by a more posterior extension of the cirrus sac which, in some specimens, extends almost to the ovary.

—OVER

Family: Allocreadiidae Stossich, 1903.

Genus: *Stenopera* Manter, 1933.

The genus *Stenopera* was erected by Manter (1933) for the species *Stenopera equilata* recovered from the intestine of a marine fish, *Holocentrus ascensions*, at Tortugas, Florida, U.S.A. *S. equilata* Manter, 1933, is the only species so far known to the genus. In having unipolar filamented eggs, the genus *Stenopera* stands close to the genus *Helicometra* Odhner, 1902 nec. Travassos, 1928. On the basis of the shape and great length of the cirrus sac, far forward position of the ventral sucker and the elongated body with sides nearly parallel, Manter in 1933 differentiated the genus *Stenopera* from *Helicometra*. The writer has been able to obtain two digenetic trematodes having eggs with unipolar filaments and very much elongated cirrus sac. These specimens have been assigned to a new species under the genus *Stenopera*.

Generic diagnosis.—Allocreadiidae Stossich, 1903. Body: elongate. Suckers: ventral sucker far forward. Gut: pharynx small; oesophagus moderately long; caeca narrow, extending to posterior end of body. Excretory system: excretory vesicle extending to level of ovary. Reproductive system: genital pore median or submedian, anterior to intestinal bifurcation near the base of pharynx. Cirrus sac slender, curved, very long, extending posteriorly behind ventral sucker. Testes tandem, median and slightly lobed. Ovary lobed, situated anterior to testes. Vitellaria lateral, confluent behind testes, not extending anterior to intestinal fork; yolk reservoir anterior to ovary; receptaculum seminis either in front of dorsal to ovary. Metraterm present, shorter than cirrus sac. Eggs with unipolar filaments.

Type species: *Stenopera equilata* Manter, 1933.
Parasites of marine fishes.

The generic diagnosis has been modified in respect of the position of the receptaculum seminis, which is dorsal in my specimen, and the vitellaria.

FROM N.K. GUPTA, 1956

IV. Genus *Stenopera* Manter, 1933

Diagnosis: Plagioporinae: Body elongate, smooth. Oral sucker small. Acetabulum near anterior extremity. Prepharynx absent; pharynx ovoid; oesophagus short or moderately long; caeca narrow, terminating at posterior extremity. Genital pore median or submedian, anterior to intestinal bifurcation or near base of pharynx. Testes tandem, postequatorial, slightly lobed. Cirrus sac slender, curved, very long, reaching far behind acetabulum, enclosing sinuous tabular vesicula seminalis, winding ejaculatory duct surrounded by prostate cells and cirrus. Ovary lobed with seven lobes, pretesticular. Receptaculum seminis anterior or dorsal to ovary. Vitellaria extending from behind intestinal bifurcation or acetabulum to near posterior extremity, confluent behind testes. Uterus in diagonal spirals between ovary and acetabulum; metraterm present; eggs with unipolar filament. Excretory vesicle tubular, extending to level of ovary; pore dorsoterminal. Parasitic in intestine of marine fishes.
Genotype: *S. equilata* Manter, 1933

Gupta (1956) described *S. pterois* Gupta, 1956 from a marine fish *Pterois russelli* of the Gulf of Manaar (Indian Ocean).

FROM H.R. MEHRA (1966)

Helicometra

(syn. DIAGNOSIS OF GENUS STENOPERA Manter, 1933)

Allocreadiinæ of somewhat elongate body form; ventral sucker rather far forward; esophagus of moderate length; ceca narrow, extending to posterior end; genital pore median or submedian, anterior to intestinal bifurcation, near base of pharynx; cirrus sac slender, curved, very long, extending posteriorly behind ventral sucker; testes tandem, median, slightly lobed; vitellaria lateral, confluent behind testes, not extending anteriorly to ventral sucker; yolk reservoir and seminal receptacle anterior to the ovary; uterus in diagonal spirals between ovary and ventral sucker; metraterm present, shorter than cirrus sac; eggs with unipolar filaments; excretory vesicle extending to level of ovary. Intestinal parasites of marine fishes. Type species: *Stenopera equilata*.

This genus, with its filamented eggs, is most closely related to *Helicometra*. It differs from all species of *Helicometra*, however, in the shape and great length of the cirrus sac; in its elongate body with sides nearly parallel; and in the far anterior position of the ventral sucker. It was at first planned to include the trematode in the genus *Helicometra*, but the strikingly different relationship of the ventral sucker to the cirrus sac is considered to be a generic character. This morphological change is brought about not only by the more forward position of the ventral sucker but also by a more posterior extension of the cirrus sac which, in some specimens, extends almost to the ovary.

Helicometra equilata (Manter, 1933) Siddiqi and Cable, 1960 Opecoelidae

(syn. Stenopera equilata Manter, 1933)

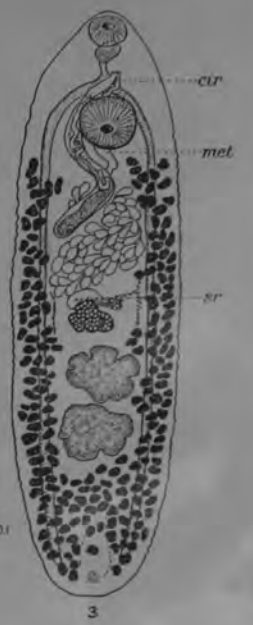
Host: Holocentrus ascensionis, squirrel fish
Localities: Tortugas; Bimini — See Sogandares 1959 — also in Hawaii (Pritchard)

Sides of body almost parallel; Length 0.814-1.68 mm/

1.68 mm.; width 0.259 to 0.45 mm., or about one-third to one-fourth the body length. The ventral sucker is located far forward and is a little larger than the oral sucker. Thus, in a 1.68 mm. specimen, the oral sucker has a diameter of 0.14 mm., the ventral sucker (about one-fifth from the anterior end) 0.189 mm. A prepharynx is lacking. There occurs an ovoid pharynx, short esophagus, and narrow ceca extending to near the posterior end of the body. The genital pore is sub-median, slightly to the left and slightly anterior to the intestinal bifurcation, near the base of the pharynx. The testes are tandem, lobed, in posterior half of body, close together. The post-testicular space is about one-fourth body length. The cirrus sac is very elongate, narrow, curved more or less into an S-shape, extending around the right border of the ventral sucker, bending medianly, then rather sharply turning to the right and extending posteriorly about halfway between ventral sucker and the ovary. In some contracted specimens the cirrus sac reaches almost to the ovary. The posterior third of the cirrus sac (inclined toward

Table of measurements of five specimens

Length	1.68 mm.	1.36 mm.	0.873 mm.	0.814 mm.	1.406 mm.
Width	0.42	0.455	0.259	0.286	0.333
Oral sucker	0.14	0.119	0.093	0.093	0.104
Ventral sucker	0.189	0.17	0.112	0.115	0.122
Anterior end to ant. edge ventral sucker	0.245	0.126	0.15	0.193	0.204
Post-testicular space	0.4	.....	0.229	0.127	0.177
Metraterm	0.37	0.333			
Eggs	45 by 24μ	52–56 by 25–27μ			



the right) is filled with an elongate, tube-like seminal vesicle. This leads into a coiled tube surrounded by prostate cells. The cirrus extends from the genital pore to the anterior border of the ventral sucker. The ovary is median, lobed, just in front of the anterior testis and immediately posterior to mid-body. The yolk reservoir is to the right at the anterior border of the ovary. The seminal receptacle is also anterior to the ovary but overlapping it dorsally. The vitellaria are composed of medium-sized follicles extending in the sides of the body from a level shortly posterior to the ventral sucker to the posterior end of the body. They are confluent behind the testes. The uterus spirals in diagonal coils (tending to be longitudinal) between the ovary and the ventral sucker. The metraterm is almost straight and extends a short distance posterior to the ventral sucker. The eggs are provided with unipolar filaments and measure 45 to 56 by 24 to 27 μ. The excretory pore is dorsal a short distance from the posterior tip. The undivided excretory vesicle extends forward to the region of the ovary.

Helicometra equilata (Manter, 1933) n. comb. (FIGURE 83)

Synonym:

Stenopera equilata Manter, 1933.

Host: *Holocentrus ascensionis*.

Site: intestine.

Locality: Mona Island, P. R.

Deposited specimen: No. 39358.

The genus *Stenopera* Manter, 1933, is here reduced to synonymy with *Helicometra*. In our opinion, the elongated cirrus sac and anterior position of the ventral sucker are of no more than specific value.

from Siddiqi & Cable, 1960

OVER

Stenopera equilata Manter, 1933
(Figure 48)

Host.—*Holocentrus ascencionis* (Osbeck), squirrel-fish.

Location.—Pyloric ceca.

Locality.—Lerner Fish Pens, N. Bimini, and near Cat Cay, B.W.I. [new locality record].

Sogandares, 1959

Helicometra equilata (Manter, 1933)
Siddiqi & Cable, 1960

Synonym: Stenopera equilata Manter, 1933.

Host: Holocentrus ascensionis (J).

Site: intestine. JAMAICA

FROM NAHHAS AND CABLE (1964)

Helicometra equilata (Manter, 1933)
Siddiqi and Cable, 1960
New synonym: *Helicometra boseli* Nagaty, 1956

Distribution

Holocentrus ascensionis—Tortugas, Florida (Manter 1933); Bahamas (Sparks 1957); British West Indies (Sogandares-Bernal 1959); Mona Island, Puerto Rico (Siddiqi and Cable 1960); Jamaica (Nahhas and Cable 1964).

H. lacteoguttatus—Hawaii (Pritchard 1966 and Yamaguti 1970), as *Helicometra boseli*.

H. sammara—Red Sea (Nagaty 1956*b*), as *Helicometra boseli*; Hawaii (Yamaguti 1970), as *H. boseli*.

H. spinifer—Hawaii (Yamaguti 1970), as *Helicometra boseli*.

H. xantherythrus—Hawaii (Pritchard 1966 and Yamaguti 1970), as *Helicometra boseli*.

Naso unicornis—Hawaii (Pritchard 1966), as *Helicometra boseli*.

With the inclusion of the type species of *Stenopera* in *Helicometra*, *H. equilata* must be regarded as the first species of *Helicometra* to be described with a short forebody and a cirrus sac which extends far posterior to the acetabulum.

Although *H. equilata* has been reported rather frequently, no descriptive information other than Manter's (1933) original data is available for this species. We, therefore, take this opportunity to report additional measurements (Table 4) from the materials collected by Nahhas and Cable (1964) and Sparks (1957). The new data (Table 4) establish greater ranges of variation for the sucker ratio, testes shape and arrangement, location and shape of the ovary, anterior extent of the vitellaria, and egg size. Since all of the specimens originated from the same host and geographical area, and numerous intermediate conditions were found between the ranges of each characteristic, there can be little doubt that the concept of *H. equilata* must be broadened to include the variability shown in Table 4.

The brief description of *H. boseli* given by Nagaty (1956*b*) was supplemented by Pritchard (1966) and Yamaguti (1970). These latter reports (Table 4) further indicate that morphological variations may be expected when substantial numbers of specimens are examined. Yamaguti (1970) did not state the location of the ovary in relation to the anterior testis but the ovary of a specimen of *H. boseli* (slide 2715 from the Yamaguti Collection), which has a body length of 3.27, is 0.13 anterior to the anterior testis. This information is also pertinent, for Nagaty (1956*b*) described the location of the ovary of *H. boseli* as immediately pretesticular. With the publication of the data on the specimens of *H. equilata* recovered by Nahhas and Cable (1964) and Sparks (1957), all the characteristics of *H. boseli* overlap those of *H. equilata*; therefore *H. boseli* is placed in synonymy with *H. equilata*.

From SEKERAK & ARAI, 1974

Allocreadiidae

Stenopera equilata[1] n.g., n.sp.

(Fig. 3)

[1] *Steno*=narrow, *pera*=sac, for the slender cirrus sac. *equilata*, referring to the equally broad body.

Host: *Holocentrus ascensionis*.
Incidence: Present in both of two hosts examined.
Position: Intestine.
Distribution: Tortugas, Florida.

The body is elongate, broadly rounded posteriorly but somewhat more narrowed anteriorly. The sides of the body are almost parallel from the level of the ventral sucker almost to the posterior end. Length 0.814 to 1.68 mm.; width 0.259 to 0.45 mm., or about one-third to one-fourth the body length. The ventral sucker is located far forward and is a little larger than the oral sucker. Thus, in a 1.68 mm. specimen, the oral sucker has a diameter of 0.14 mm., the ventral sucker (about one-fifth from the anterior end) 0.189 mm. A prepharynx is lacking. There occurs an ovoid pharynx, short esophagus, and narrow ceca extending to near the posterior end of the body. The genital pore is sub-median, slightly to the left and slightly anterior to the intestinal bifurcation, near the base of the pharynx. The testes are tandem, lobed, in posterior half of body, close together. The post-testicular space is about one-fourth body length. The cirrus sac is very elongate, narrow, curved more or less into an S-shape, extending around the right border of the ventral sucker, bending medianly, then rather sharply turning to the right and extending posteriorly about halfway between ventral sucker and the ovary. In some contracted specimens the cirrus sac almost reaches to the ovary. The posterior third of the cirrus sac (inclined toward the right) is filled with an elongate, tube-like seminal vesicle. This leads into a coiled tube surrounded by prostate cells. The cirrus extends from the genital pore to the anterior border of the ventral sucker. The ovary is median, lobed, just in front of the anterior testis and immediately posterior to mid-body. The yolk reservoir is to the right at the anterior border of the ovary. The seminal receptacle is also anterior to the ovary but overlapping it dorsally. The vitellaria are composed of medium-sized follicles extending in the sides of the body from a level shortly posterior to the ventral sucker to the posterior end of the body. They are confluent behind the testes. The uterus spirals in diagonal coils (tending to be longitudinal) between the ovary and the ventral sucker. The metraterm is almost straight and extends a short distance [illegible] provided [illegible]

Table of measurements of five specimens

Length	1.68 mm.	1.36 mm.	0.873 mm.	0.814 mm.	1.406 mm.
Width	0.42	0.455	0.259	0.286	0.333
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Anterior end to ant. edge ventral sucker	0.245	0.126	0.15	0.193	0.204
Post-testicular space	0.4	.....	0.229	0.127	0.177
Metraterm	0.37	0.333			
Eggs	45 by 24μ	52–56 by 25–27μ			

3

Stenopera boseli (Nagaty, 1956) Pritchard, 1966

Helicometra boseli ~~n. sp.~~ Nagaty, 1956
(Fig. 9)

Twenty specimens were obtained from *Holocentrus samara*, locally called "Boseli," from Ghardaga.

Description: Body elongate, with nearly parallel sides, narrowing anteriorly, 2.7 to 4.09 long by 0.39 to 0.99 in maximum width. Acetabulum slightly larger than oral sucker, 0.23 to 0.36 in diameter, situated mostly at anterior quarter of body length. Oral sucker 0.193 to 0.22 in diameter; pharynx well developed; esophagus of medium length; ceca end 0.35 from posterior end of body. Testes 2, in posterior half of body, irregularly lobed, usually tandem but may be slightly oblique. Cirrus sac 0.51 to 1.02 long, extending well posterior to acetabulum, containing a winding *vesicula seminalis interna*. Genital atrium median, a little anterior to acetabulum. Ovary typically 4-lobed, median, directly anterior to anterior testis; seminal receptacle large, retort-shaped, anterior to ovary. Vitellaria abundant, lateral, extending from anterior edge of acetabulum to posterior end of body. Uterus preovarian; eggs yellowish, with antopercular filament 4–5 times as long as egg proper which measures 0.05 by 0.035.

Discussion: Helicometra boseli differs from any known species of the genus in that the cirrus sac extends well posterior to the acetabulum.

Stenopera boseli (NAGATY, 1956) n. comb.
(Figs. 17—18) Syn. Helicometra boseli Nagaty

Hosts: *Holocentrus lacteoguttatus* CUV., ala-'ihi (Holocentridae), new host record; 19 specimens from 5 of 12 hosts.

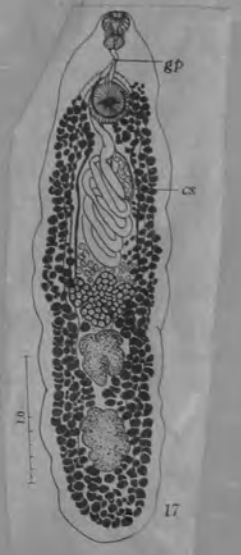
H. xantherythrus J. and E., new host record; 2 specimens from 2 of 44 hosts.

Naso unicornis (FORSKÅL), kala or unicorn fish (Acanthuridae), new host record but probably accidental; 1 specimen from 27 hosts.

Location: Intestine.

Specimen deposited: No. 60355

Brief description of Hawaiian specimens: Body 1.300 to 4.237 mm long by 315 to 962 wide; forebody and posttesticular space one-seventh to one-fifth body length. Oral sucker 86 to 194 in diameter; acetabulum 128 to 302 in diameter; sucker ratio 1 : 1.1 to 1.6, usually about 1 : 1.3. Cirrus sac (Fig. 18) muscular, sigmoid to straight, 400 to 1,176 by 40 to 147, proximal end midway between ovary and acetabulum; seminal vesicle tubular, coiled, in basal third to half of cirrus sac. Eggs 35 to 50 by 21 to 34.



Stenopera equilata Manter, 1933
see SEKERAK & ARAI, 1974

113. *Helicometra boseli* Nagaty, 1956*
(Fig. 62)

HABITAT: Intestine of *Holocentrus lacteoguttatus, H. spinifer, H. xantherythrus*, and *H. sammara*; Hawaii.

DESCRIPTION (based on 23 flattened whole mounts): Body 1.7-4.7 X 0.22-1.0 mm; oral sucker 0.1-0.18 X 0.095-0.23 mm; pharynx 59-120 X 60-140 μ; esophagus 0.09-0.3 mm long. Acetabulum 0.15-0.33 mm in diameter, about middle of anterior third of body. Testes indented irregularly, 0.12-0.4 X 0.1-0.32 mm, tandem, at about middle of posterior half of body. Cirrus pouch elongate claviform, 0.3-1.1 X 0.05-0.15 mm, containing N-shaped or more irregularly winding seminal vesicle in its swollen posterior portion which reaches far back of acetabulum; ejaculatory duct more or less strongly winding in attenuated anterior portion. Genital pore median, prebifurcal.

Ovary distinctly four- to seven-lobed, 0.12-0.48 X 0.17-0.45 mm, postequatorial. Receptaculum seminis retort-shaped or cylindrical, 40-110 μ wide, usually anterodorsal to ovary. Laurer's canal arising from anterior end of seminal receptacle, winding, opening dorsal to uterus some distance anterior to ovary. Uterus closely coiled between cirrus pouch and ovary; metraterm well differentiated, rather straight, commencing from behind acetabulum. Eggs oval, 35-58 X 23-35 μ in life; posterior polar filament 70-300 μ long. Vitellaria commencing at acetabular level or immediately behind it, confluent in posttesticular area. Excretory vesicle tubular, reaching to anterior end of ovary, with dorsoterminal pore.

DISCUSSION: Our specimens agree completely with Pritchard's (1966). *Stenopera equilata* Manter, 1933, the specific identity of which was doubted by Pritchard, seems to be valid, though the genus *Stenopera* Manter, 1933 might better be suppressed in favor of *Helicometra*, as suggested by Siddiqi and Cable (1960).

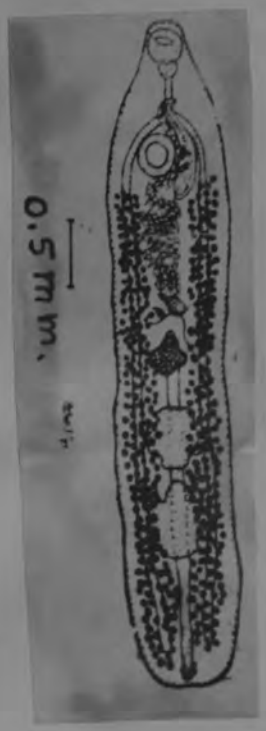
from YAMAGUTI, 1970

* Pritchard (1966) transferred this species to *Stenopera* Manter, 1933, but there is some doubt about the validity of this genus because the anterior extent is variable in relation to the acetabulum. Therefore, for the present, I prefer to ratain the original assignment.

Helicometra nasae ~~n. sp.~~ NAGATY AND ABDEL AAL, 1962

(Fig. 2)

LOCALITY: GHARDAGA, RED SEA



Twenty-five trematodes were stained and mounted, and the following description based on ten of these only. They are obtained from *Nasa* sp. locally called "dakkara" and *Epeneiptelus fasciatus* locally called "koshari abu full".

Body flat, elongate, 3.15-6.30 and 0.48-0.50 wide; anterior end narrow, and posterior end broad; cuticle smooth without scales or spines, it may be undulating. Oral sucker 0.18-0.24 by 0.20-0.30 subterminal pharynx 0.08-0.11 by 0.09-0.14 may be slightly overlapped by posterior border of oral sucker. Esophagus elongate 0.11-0.23 long. Intestinal ceca extending near posterior extremity; terminating at 0.05-0.17 from posterior end of body. Ventral sucker small measuring 0.21-0.35 by 0.23-0.35 and may be submedian, nearly in anterior third of body length; 0.30-0.50 from oral sucker. Ratio of oral to ventral suckers 0.9:1.

Testes two, intercecal, irregularly lobed, almost four lobes, usually tandem, measuring 0.23-0.57 by 0.24-0.50 for anterior tetis and 0.38-0.65 by 0.26-0.48 for posterior testis, in posterior half of body length. Cirrus pouch elongate, extending back of acetabulum and towards its lateral side, with swallen posterior portion and narrow anteriorly; containing winding vesicula seminalis interna. Genital atrium almost median at level of esophagus or intestinal bifurcation.

Ovary four lobed, intercecal, median, pretesticular, some distance anterior to testis, distance between them 0.08-0.30, nearly in middle third of body length. Receptaculum seminis preovarian pear-shaped measuring 0.11-0.15 by 0.06-0.08. Vitellaria composed of numerous small follicles, partly extra- and partly intercecal, overlapping ceca and some time slightly the outer border of testes and extending to near posterior end, anteriorly extending almost to level of posterior border of cirrus pouch or to level of posterior border of acetabulum; vitelline duct well developed and transversely extending anterior to ovary. Uterus coiled, extending from anterior to ovary, reaching to acetabulum; anterior to acetabulum [illegible] joint with cirrus and open by common genital atrium. Eggs oval, filamented, with long filaments, averaging 0.05 by 0.03. Excretory vesicle tubular reaching to anterior border of ovary.

Comparisons:

This species resembles *H. beseli* Nagaty, 1956, mainly in that the cirrus sac extending well posterior to acetabulum, a character not known in other species of the genus. It differs from *H. beseli* chiefly in having (1) vitellaria extending almost from level of posterior border of acetabulum and (2) ovary some distance anterior to anterior testis instead of lying directly anterior to anterior testis.

Helicometra nasae Nagaty and Abdel Aal, 1962
New synonym: *Helicometra rectisaccus*
(Fischthal and Kuntz, 1964)
Fischthal and Kuntz, 1965

Distribution

Epinephelus fasciatus—Red Sea (Nagaty and Abdel Aal 1962).

Holocentrus violaceus—Puerto Princess, Philippines (Fischthal and Kuntz 1964) as *Stenopera rectisaccus*.

Naso sp.—Red Sea (Nagaty and Abdel Aal 1962).

Nagaty and Abdel Aal (1962) stated that the acetabulum of *H. nasae* was located "Nearly in anterior third of body length," but in their Fig. 2, the acetabulum is in the anterior fifth of the body. The latter information was apparently used by Pritchard (1966) to include *H. nasae* in *Stenopera*. In the original description, the anterior extent of the vitellaria and the location of the ovary were used to differentiate *H. nasae* from *H. boseli* (=*H. equilata*). These characteristics are no longer useful in distinguishing these species. The very slightly curved cirrus sac extending to about one-third of the distance between the acetabulum and the ovary of *H. nasae*, as opposed to the strongly curved, sigmoid or sinuous cirrus sac extending to at least half the distance between the acetabulum and the ovary of *H. equilata*, appear to be the only characteristics which separate these species.

Since *H. rectisaccus* was originally assigned to *Stenopera*, this species was never compared critically with *H. nasae* (Table 4). Pritchard (1966) stated that *H. rectisaccus* was probably a synonym of *H. nasae*, since they seemed to agree in all major characteristics. Type specimens of *H. nasae* could not be obtained but examination of the two paratypes of *H. rectisaccus* did not reveal any specific differences. The straight cirrus sac which extends along the median line of *H. rectisaccus* and the very slightly curved cirrus sac of *H. nasae* cannot be regarded as distinguishing characteristics, since it has been demonstrated in *H. pulchella* and in *H. equilata* that considerable intraspecific variation occurs in the shape of the cirrus sac and its orientation with respect to the acetabulum. We, therefore, consider *H. rectisaccus* a synonym of *H. nasae*.

The validity of *H. nasae* must also be questioned, since the only feature which appears to be of some value in distinguishing *H. nasae* from *H. equilata* appears to be the relatively straight cirrus sac of *H. nasae* as compared with the strongly curved or sinuous cirrus sac of *H. equilata*; even this characteristic seems questionable since Pritchard (1966) reported sigmoid to straight cirrus sacs for her specimens of *H. boseli* (=*H. equilata*). Since these specimens were not examined during the course of this study, we prefer to retain *H. nasae* for the present time.

from SEKERAK & ARAI, 1974

Stenopera nasae (Nagaty and Abdel Aal, 1962)

Stenopera rectisaccus ~~n. sp.~~ (Figs. 5 and 6) FISCHTHAL AND KUNTZ, 1964

HOST: *Holocentrus violaceus* (Holocentridae).

HABITAT: Small intestine.

LOCALITY: Puerto Princesa, Palawan Island, Philippines.

DATE: 20 May 1962.

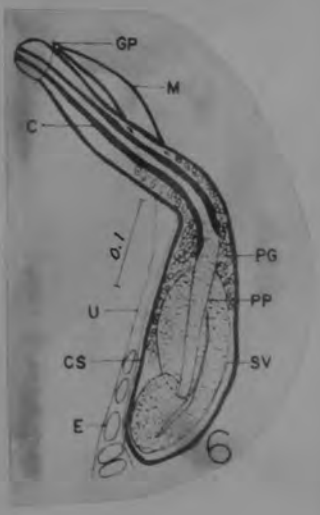
TYPES: USNM Helm. Coll. No. 37896 (one slide of type), and No. 37897 (two slides with one paratype each).

DESCRIPTION (based on three specimens): Body elongate, 2,237 to 2,485 plus (longest worm with part of posttesticular body missing) by 250 to 487, extremities round; preoral lobe (in one) 11, forebody 360 to 420, hindbody 1,806 to 2,100, posttesticular space (in two) 380 to 430. Oral sucker round, 152 to 157 by 148 to 157, subterminal ventral. Acetabulum round to slightly transversely elongate, 184 to 220 by 185 to 230. Sucker length ratio 1:1.21 to 1.40. Prepharynx length (in two) 15 to 41; pharynx slightly longer than wide, 68 to 73 by 61 to 63; esophagus length 109 to 145; cecal bifurcation slightly preacetabular; ceca narrow, extending to within 50 to 150 of posterior extremity. Excretory bladder tubular, extending to ovarian region; pore terminal.

Testes two, tandem, slightly lobed, intercecal, longer than wide, anterior testis at about middle of hindbody; testes 104 to 171 apart; anterior testis 172 to 255 by 121 to 237; posterior testis 186 to 265 by 109 to 255; acetabulum to anterior testis 940 to 1,050, to posterior testis 1,240 to 1,470. Cirrus sac 445 to 570 by 92 to 121, elongate, clavate, straight, median, commencing 177 to 305 postacetabular and terminating 29 to 99 preacetabular at genital pore, may extend posteriorly beyond anterior limit of vitellaria; containing convoluted seminal vesicle, straight, thin walled, short pars prostatica surrounded by prostate gland cells, and straight, long, muscular, thick walled cirrus; cirrus sac tip protrusible through genital pore; latter slightly anterior to cecal bifurcation, very slightly submedian to left. Vasa efferentia very long, uniting to very short vas deferens entering cirrus sac.

Ovary 143 to 172 by 97 to 155, four lobed, median, intercecal, in tandem with testes, 67 to 111 pretesticular, 710 to 805 postacetabular. Seminal receptacle 116 to 140 by 51 to 85, elongate, anterodorsal to ovary; Mehlis' gland prominent, anterodorsal to ovary; Laurer's canal opening dorsally anterior to ovary. Vitelline follicles circumcecal, in lateral fields, anterior limit of right field different from left (65-165, 550-275, 95-165 postacetabular in three specimens), terminating near posterior extremity; vitelline reservoir anterodorsal to ovary. Uterus spiraling in diagonal coils intercecally between ovary and posterior portion of cirrus sac, ascending ventral to latter up to anterior portion of acetabulum, then crossing on right; metratern thick walled, muscular, short, commencing at about level of anterior fifth of acetabulum dorsum. Ten eggs 41 to 51 by 27 to 32, with unipolar filament.

DISCUSSION: *Stenopera* was described by Manter (1933) with *S. equilata* from *Holocentrus ascensionis* from Tortugas, Florida, as type. Sparks (1957) reported this species from the same host from the Bahama Islands. Gupta (1956) described *S. pteroisi* from *Pterois russelli* from India. Comparison of *S. rectisaccus* with the type specimen of *S. equilata* (USNM Helm. Coll. No. 29956) and the description by Manter (1933) indicated several fundamental differences. In the latter the metratern commences a short distance postacetabular; the cirrus sac is longer and more or less S-shaped, extending around the right border of the acetabulum; the seminal vesicle is straight, and the pars prostatica coiled; the testes are wider than long; and the space between the acetabulum and ovary is relatively shorter. In *S. pteroisi* the cirrus sac is longer and more or less S-shaped; the pars prostatica is coiled; the esophagus is longer and the cecal bifurcation farther preacetabular; the vitellaria extends anteriorly to the level of the acetabulum or slightly preacetabular; and the ovary has seven lobes and is situated an appreciable distance pretesticular. The species name *rectisaccus* (L. *rectus*, straight; L. *saccus*, sac) refers to the straight cirrus sac.



Stenopera pteroisi n.sp. (Fig. 1) N.K. GUPTA, 1956

Two specimens of *Stenopera pteroisi* n.sp. were found in the marine fish, *Pterois russelii*, dissected at Mandapam Camp. The mounted specimens are 4·2–4·5 mm. long and 0·32–1·25 mm. broad across the region of the testes. The anterior end is more attenuated than the posterior end. The integument is without spines or papillae. At the anterior end of each specimen are seen some fibrillar projections. The oral sucker is subterminal and it measures 0·09–0·22×0·16–0·22 mm. Prepharynx is absent. The oral sucker is directly followed by the muscular pharynx which is 0·06–0·08 mm. long and 0·06–0·11 mm. broad. The oesophagus is 0·24–0·35 mm. long and 0·01–0·03 mm. broad. It forks into two intestinal caeca at a distance of 0·23 mm. from the anterior border of the ventral sucker. The intestinal caeca run parallel to the lateral sides of the body and terminate a little in front of the posterior end of the body. The ventral sucker lies at a distance of 0·69–0·83 mm. from the anterior end of the body. It is almost circular, i.e. 0·17×0·17 or 0·36×0·36 mm. Its aperture is small. The ratio between the diameters of the oral and ventral suckers is nearly 1:1 in one specimen and 1:1.5 in the other specimen. The excretory pore is median and dorsally placed at the posterior end of the body. The excretory vesicle is dilated at first and then becomes narrow and uniformly wide.

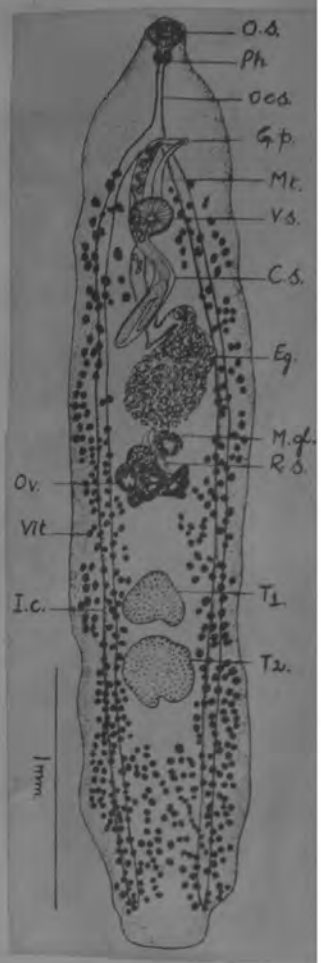
The genital pore is to the left of the median line, external to the left intestinal caecum and 0·19 mm. inward from the left body margin. In the second specimen the genital pore is almost median and placed near the point where the bifurcation of intestinal caeca occurs. The cirrus sac is very much elongated and is 0·88–0·92 mm. in length. It extends both in front and behind the ventral sucker. The seminal vesicle is coiled and fills either one-half or one-third of the cirrus sac. The prostate glands are few in number. The cirrus is very prominent. The vasa efferentia are seen meeting close to the base of the cirrus sac. The testes are irregularly shaped or may be lobed on their posterior aspects only. In the second specimen only one testis is present, the other seems to have atrophied. The anterior testis measures 0·17×0·19 mm. while the posterior measures 0·27–0·28×0·21–0·29 mm.

The ovary is lobed and lies much in front of the anterior testis in the median line. It has three lobes on the left and four on the right. The Mehlis' gland lies in front and close to the ovary. The receptaculum seminis is partly dorsal to the ovary. The uterus is very much coiled but it is confined to the pre-ovarian region. It crosses the obliquely placed basal part of the cirrus sac and then turns to the right and proceeds forward dorsal to the acetabulum and opens at the genital pore through the metraterm which is a straight tube. The vitellaria extend from the level of the region between the intestinal fork and the ventral sucker back to the ends of the intestinal caeca or the posterior end of the body. In the post-testicular region they coalesce in the median line. The eggs are provided with unipolar non-motile filaments and are 0·038–0·041 mm. long and 0·019–0·026 mm. broad.

Relationships:—*Stenopera pteroisi* n.sp. differs from *S. equilata* Manter, 1933, in having a longer oesophagus, vitellaria extending from the posterior extremity of the body to the level of or a little in front of the ventral sucker; the ovary situated at an appreciable distance from the anterior testis, with seven lobes, three on the left and four on the right; and testes lobed especially on the posterior aspects. In *S. equilata*, the oesophagus is short, the ventral sucker is quite close to the intestinal fork, the vitellaria terminate a little behind the ventral sucker, the ovary is slightly lobed and is placed not far from the anterior testis and the testes are lobed almost on all sides.

The new species is larger than *S. equilata* and has smaller eggs. It has been named after the genus of its host.

Host: *Pterois russelii* (Bennett).
Location: Intestine.
Locality: Gulf of Manaar (India).



Helicometra pteroisi (Gupta, 1956) Siddiqi and Cable, 1960

Distribution

Pterois russelii—Gulf of Manaar, India (Gupta 1956).

Helicometra pteroisi was originally referred to *Stenopera* by Gupta (1956). This species was described from two specimens and compared with *H. equilata* from which it differs in having vitellaria which extend into the forebody. Despite the new information on *H. equilata* and the synonymy of *H. boseli* with *H. equilata* this characteristic still distinguishes *H. pteroisi*.

From SEKERAK & ARAI, 1974

STENOPERA